A Database Publication

THE MICRO USER

Volume 5
Number 3
May 1987
£1.25

Top-selling guide to the BBC Micro!

UTILITY
Automate your disc catalogues

GAMES
Fast action: Duck's Dinner
Family fun: Classic Ludo

REVIEWS
TV Director, ATS rom and the latest games

EDUCATION
Surprise facts about school computing

BODY BUILD
Construct a video digitiser

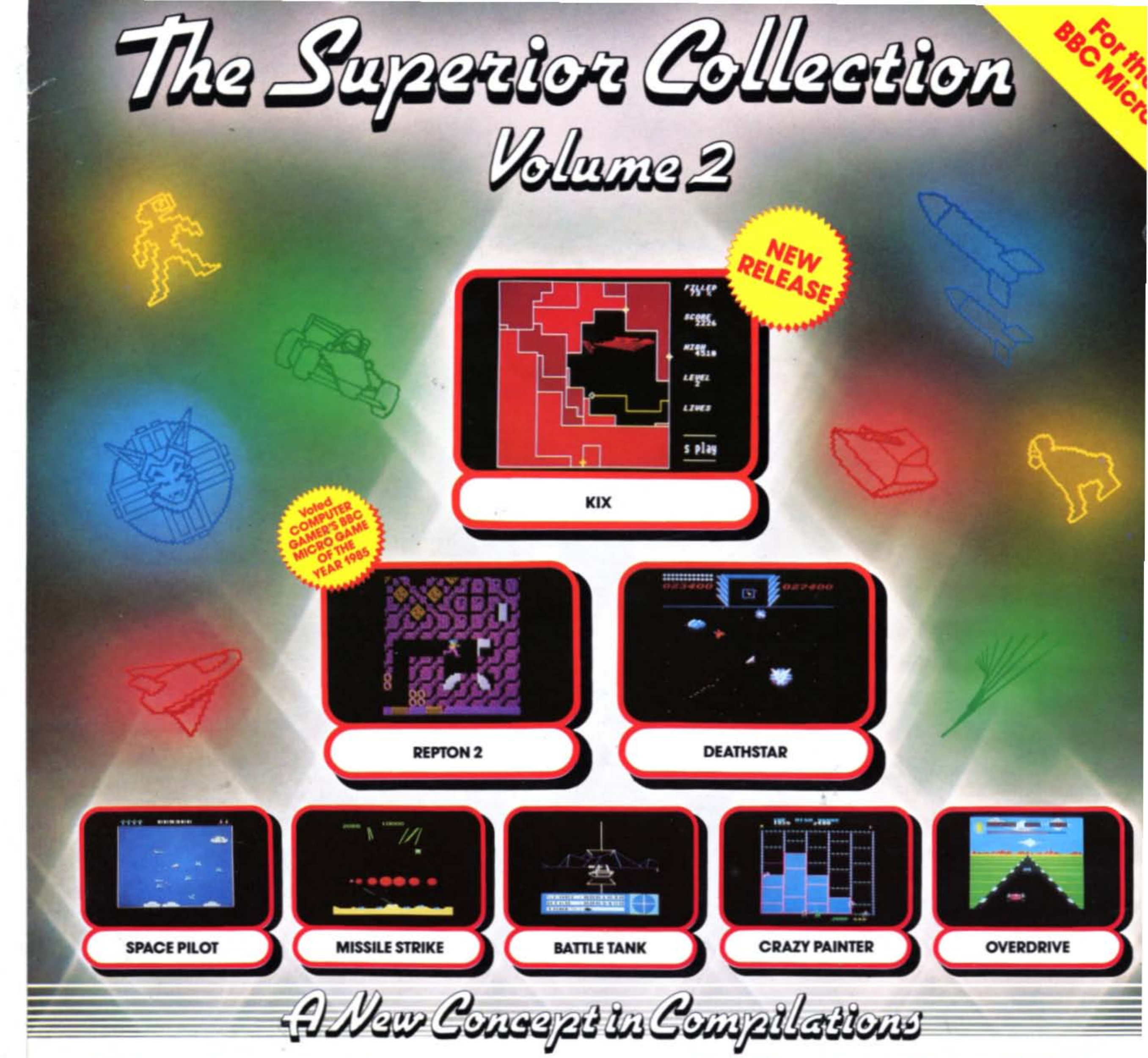
HAC MAN
Getting more from Stryker's Run

Page-by-page guide to CEEFAX

Plus

downloading telesoftware, creating carousels – and much, much more!

BBC CITYNEWS
WEATHER
TRAVEL
No Shout!
291
motoring news follows in a moment
Christian Comment
BBC SPOR
WORLD SNOOKER CHAMPIONSHI
FOOTBALL
MOTOR SPORT
CEEFAX
BBC1
News.........101
Finance......120
Weather and Travel.......151
CAT
Program Index
TFSinfo
Acorn TFS details 720
Squash SqData
Use 40 column text even in mode 2 726
T/OSB04 B/OSB04
Part 4 of OSBITS - the machine-code tutorial guide 727 728
MLive13
Micro-Live programme notes 729
Effects Info
Sound utilities for sideways RAM use 732 733
More



The Superior Collection Volume 2 features one brand new game, Kix, together with 7 of Superior Software's smash hits for the BBC Micro.

Kix is a fascinating strategic game in which you play the role of the intrepid Kix, whose objective is to take control of each of 20 quadrants; you must cover at least 75% of a quadrant's area in order to seize power over the entire quadrant. You can choose to move quickly or, to earn extra points, take a slower pace — but be ready to speed up immediately if you get cornered. The quadrants are guarded by Tracers who are aided and abetted by the fast-moving Fuse. Two excellent soundtracks add to the atmosphere of this fantastic game, which is worth at least £7.95 in its own right.

BBC Micro dual cassette	£9.95
BBC Micro 5¼" disc	£11.95
BBC Master Compact 3½" disc	£14.95

Here's what the computer press said about some of the other titles on this compilation package:—

REPTON 2: "Repton 2 is better than anything I've played on the BBC Micro or Electron. Brilliant!" . . . ACORN USER

DEATHSTAR: "Deathstar is a super fast, all action arcade classic. It's the sort of game that you can't put down . . . The graphics are excellent and the scrolling is very smooth in all four directions. The pace is fast and furious even on the starting screen. This action packed game is recommended for all arcade gamers."
. . . ELECTRON USER

SPACE PILOT: "The professional presentation — well up to the usual Superior standard — coupled with the incredible addictiveness makes Space Pilot a must for all shoot'em-up fans.

Instructions	65%
Playability	95%
Graphics	90%
Value for Money	65%

Awarded ★★★★★ (Top Rating)"
. . . HOME COMPUTING WEEKLY

CRAZY PAINTER: "Great sound and graphics, smooth and accurate animation, responsive and simple controls.

Instructions	70%
Playability	100%
Graphics	100%
Value For Money	100%

Awarded ★★★★★ (Top Rating)"
. . . HOME COMPUTING WEEKLY

All games are compatible with the BBC B, B+ and Master series computers.

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XOR

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> *"...this is one of the most compulsive, cunning and attractive programs I've seen for some time! .... the game is superb - a very classy original twist on the basic maze theme" A+B Computing*

XOR's Features

- 15 graded mindbending mazes - each maze approximately 16 screens
- super smooth high speed scrolling
- high resolution quality graphics
- high speed or step by step replay feature
- intriguing logical problems
- interactive dynamic puzzles

XOR MAZE GENERATOR

The XOR Maze Generator is a truly professional utility, in fact it's the very same generator we used to create the first collection of XOR puzzles. The package is fully menu driven and simple to use, the user simply places any predefined icons onto the maze screen. Included in the package is an ICON DESIGNER so that you can change the appearance of the game characters to baffle and delight your friends.

BBC B, B+, MASTER SERIES, ELECTRON

XOR	
BBC Disk	£12.95
BBC Cassette	£9.95
Electron Cassette	£9.95
XOR Maze Generator	
BBC Disk	£14.95

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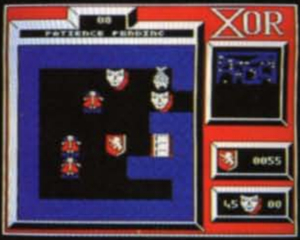

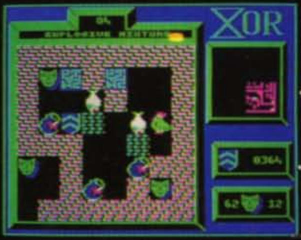

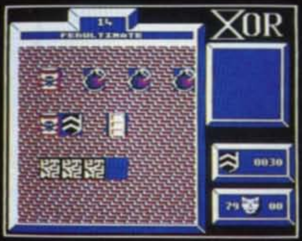

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Vol. 5 No. 3 May 1987

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Published by:
Database Publications Ltd,
Europa House, 68 Chester Road,
Hazel Grove, Stockport SK7 5NY.

Subscription rates for
12 issues, post free:
£15 – UK & Eire (Sterling only)
£25 – Europe
£42 – Rest of world (airmail)

ABC 59,727
Jan-June 1986

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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The Micro User is an independent publication and neither the BBC nor Acorn Computers Ltd are responsible for any of the articles in this issue or for any of the opinions expressed.

News trade distribution: Diamond Europress Sales & Distribution, Unit 1, Burgess Road, Ivyhouse Lane, Hastings, East Sussex TN35 4NR. Tel: 0424 430422.

CONT

Games

115 Duck's Dinner!
Help Daffy Duck get his dinner and avoid the poison skulls.

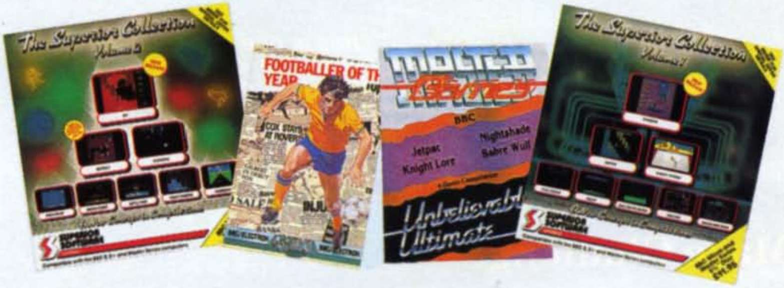
144 Ludo
An excellent implementation of the popular family game.

Utilities

42 Interactive Programs CEEFAX
Incorporate the wealth of teletext into your own programs.

135 Disc Cataloguer
Find those misplaced files fast with this powerful file database.

Reviews



31 Software Scene
Our experts take a look at some of the latest software.

47 ATS Rom CEEFAX
Find out about the exciting capabilities of this teletext rom.

55 TV Director
We look at a program to generate your own pop videos.

Education

67 News
Up to date reports about ways of using the BBC Micro in education.

71 Software Review
Take temperatures automatically with Measure and Tell.

75 Survey
What a Government enquiry into Computers in Schools reveals.

77 Sid and the Beetle
A simple teaching aid for logical thinking — and it's fun too.

81 Letters
Another selection from our mailbag expressing educational views.

ENTS

Features

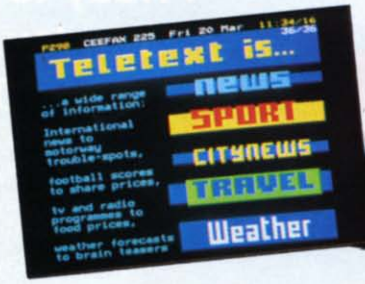
7 News
All the latest in the ever-changing world of your BBC Micro.

23 STAR
We show you how to interpret the syntax of star commands.

34 BBC Micros at the BBC CEEFAX
Just how do the reporters bring their news stories into your home.

37 Telesoftware CEEFAX
Free BBC Micro software on Ceefax: What can you receive – and how.

53 How teletext works CEEFAX
Find out how the hundreds of pages of Ceefax get on to your screen.



P298 CEEFAX 225 Fri 20 Mar 11:34/16
36/36

Teletext is...

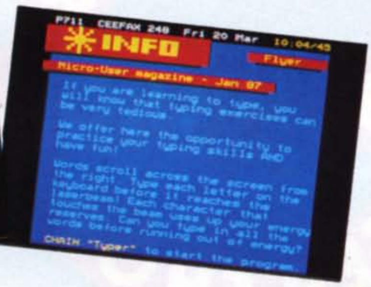
...a wide range of information:

International news to motorway trouble-spots,

football scores to share prices,

tv and radio programmes to food prices,

weather forecasts to brain teasers



P711 CEEFAX 248 Fri 20 Mar 10:04/45

INFO

Flyer

Micro-User magazine - Jan 87

If you are learning to type, you will know that typing exercises can be very tedious.

We offer here the opportunity to practice your typing skills AND have fun!

Words scroll across the screen from the right. Type each letter on the keyboard before it reaches the laserbeam! Each character that touches the beam uses up your energy reserves. Can you type in all the words before running out of energy?

CHAIN "Typer" to start the program.

57 Gallery
More artistic masterpieces created on our readers' BBC Micros.

59 Writing Games
We show how to get your sprites moving in windows.

63 Pseudocode
More on how to ease your programming problems in style.

94 Body Building
All you need to know to be able to build your own video digitiser.

98 MicroLink News
More about Britain's nationwide online database for micros.

99 Begin Here
IF you want to know how not to make decisions THEN read about ELSE.

116 Hac Man
Delve deeper into the mysteries of your favourite arcade games.

119 Problem Solved
More solutions to some of those mind-boggling hardware problems.

124 Adventures
Enter the Ice Age with a look at how to solve complex puzzles.

128 Library
More high quality routines brought together for you to use.

141 Communications
Why type programs? Here's how to get them free from MicroLink.

161 Letters
The chance to get your news, views, moans and name into print.

THE
MICRO
USER

takes the lid off CEEFAX

This month we print the first of our regular guides to free telesoftware you will be able to download from the Ceefax pages on BBC-TV. We've also

We've also included a full guide to all the principal Ceefax pages.

In addition we have lots of features that will help you to get the most from your Teletext Adapter. These are all indicated in the contents list with:

CEEFAX

If you haven't already got a Teletext adapter, once you realise what you are missing you can turn to page 165 and take advantage of our special offer.

NEXT MONTH

Utility
A powerful printer buffer

Knitting
Useful pattern designing program

Roms
Lots of utilities and features

Checksums
Key in error-free programs

Reviews
Silicon Vision Roms, Fads and more!

THE
MICRO
USER

June issue on sale May 6

Keep your finger on the pulse of the Electron and BBC Micro market

at the

ELECTRON & BBC MICRO USER SHOW

Royal Horticultural Hall Westminster London SW1

Nearest Tube: Victoria

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THE MICRO USER
May 1987

NEWS

Putting your BBC Micro to work

THE *Micro User* is about to launch a nationwide search to discover the most innovative use for a BBC Micro. Whether the machine is in a school, home or office setting, is irrelevant. It just has to have been turned into the most creative tool around.

Perhaps it is helping handicapped kids or can be found as the nerve centre of some remarkable research project.

The machine may even be used simply for fun. If your BBC Micro is being used for something truly out of the ordinary then watch for details of the new national contest in next month's issue of *The Micro User*.

You'll find it well worthwhile to take part.

Acorn denies 'close down soon' report

Acorn has reacted strongly to a report that it is on the verge of being closed down by its major shareholder Olivetti.

The company has attacked as "an inaccurate piece" an article by computer journalist Guy Kewney in Personal Computer World suggesting Acorn's days are numbered.

In his article Kewney says: "Olivetti must be getting to the crunch with Acorn, the point where it has to make up its mind whether it is worth persisting in pumping money into the company".

Kewney claims: "Olivetti has invested in Acorn for one main reason – to get the people who were designing the reduced instruction set computer known as the Acorn Risc Machine – so the decision was taken to keep the BBC contract going. But whispers from people who are in a position to hear echoes from the Olivetti boardroom suggest that the company doesn't want to keep this going for ever.

"The plan – not yet given the go-ahead – is simple. Close down Acorn and run the ARM project from inside Olivetti".

Acorn spokesman Michael Page responded: "Whispers from echoes in boardrooms are never as reliable as being in the boardroom itself – Olivetti has no desire to close Acorn down.

"What it has said is that it would be quite content to see its shareholding reduced at some point in the future if it became appropriate for Acorn to raise more equity".

Page added: "The innaccuracies start in the first paragraph of Kewney's article.

"Olivetti invested in the company in 1985. Since then Acorn has been trading without further investment from anybody, let alone Olivetti, and has been profitable for some time.

"Indeed Olivetti is currently showing a capital gain in excess of 350 per cent on its investment".

Domesday technology

THE advanced interactive video system pioneered by Acorn and Philips Electronics for the Domesday Project seems destined for wider exposure.

The BBC has just launched a two-year study of Domesday-type technology development, and is understood to favour its expansion beyond the Master AIV Micro.

Commodore Amiga and IBM PC versions are already being proposed.

TV's Micro Live facing the axe

TELEVISION's only regular computer programme, Micro Live, faces the axe. But Database Publications, prompted by hosts of letters from readers, is determined to ensure the axe will not fall.

The last Micro Live in the present series was scheduled for the end of March. Head of Continuing Education at BBC Television, David Hargreaves, said: "The present season of Micro Live is its third. We have decided not to plan a fourth for next winter.

"We want to pause, take stock and think about how we ought to be making the best contribution to our understanding of information technology in the future".

Derek Meakin, head of Database Publications, said: "Micro Live has played a leading role in introducing the delights of computing to an ever-growing audience.

"To kill the series now, when so many exciting developments are taking place in the whole world of microcomputing, is a retrograde step".

Programme director David Allen said he appreciated Database's concern. "It is a very important area which needs to have continuing exposure on television", he said. "There is a job to be done in keeping the subject in the general public's eye because it is important for the community and consumer in so many ways".

So, *Micro User* readers, it's time to play your part. If you want to help save Micro Live, write to: The Controller, BBC 2, TV Centre, Wood Lane, London W12.

Prestel via MicroLink

BBC Micro comms enthusiasts may soon be able to access Prestel's massive 300,000 page database through MicroLink.

British Telecom is merging the messaging services of Prestel and Telecom Gold, with which MicroLink is associated. This will immediately create a 130,000-strong user base of micro owners able to exchange messages with each other.

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NEWS

The Italian connection

AN English software house is building a fruitful Italian connection.

Clares Micro Supplies of Northwich has signed up new deals with Olivetti to supply programs for the PC128S – the name for the rebadged BBC Compact in Italy.

By redrawing title pages and translating some instructions, Clares has customised the software for Olivetti to sell under its own banner.

The move follows a successful partnership between the two which resulted in high sales in Italy of other titles, Artroom and Beta-Base.

The new deals relate to programs also available in Britain on the Master 128 and Compact, including Fontwise Plus and Font Editor.

Also, in response to many requests from home and Italian markets, Clares has developed the Artroom Colour Extension (ACE) incorporating suggestions from users.

Colourizer, the main program, converts the Mode 4 Artroom screen to Mode 1 and allows the user to fill in the picture using four colours. A Mode 1 screen dump is also provided.

The second program will convert any graphics mode screen into a Mode 4 Artroom screen. There is also a graphics library which provides pictures, maps and such.

ACE costs £15 on 5.25in disc for the Master and £17 on 3.5in disc for the Compact.

Three years ago . . .

ANOTHER look back at what *The Micro User* covered three years ago. This was the issue for May, 1984.

A dramatic breakthrough by Acorn on the export front has resulted in a forecast that overseas sales this year will account for up to 15 per cent of the group's turnover.

Such is the company's current success story abroad that *The Micro User* has learned that it will have opened up eight new foreign markets by the summer alone. Details have yet to be announced but it is thought that three will be in Europe, two being Italy and Spain.

* * *

Software pirates have begun to use the airwaves to distribute their illicit copies. Radio hams frequently broadcast hundreds of programs from which other hams can take their pick. Estimates of the value of software pirated this way range from £5 million to more than £20 million.

* * *

Acorn has launched its long awaited 6502 Second Processor, an expansion device which converts a standard BBC B into a high speed dual processor system. Attaching to the micro by the Tube interface, the processor consists of a 3 Mhz 6502 chip and 64k of user memory, running 50 per cent faster than the BBC Micro.

* * *

An authoring system for the BBC Micro that enables non-programmers to write computer-aided learning programs has been launched by Acornsoft. Called Microtext, the system simplifies the production of "man-computer" dialogues for use in education and training, expert advice and information retrieval and gathering.

* * *

Rumours that its Econet local area networking system is about to be dropped have been strongly denied by Acorn. "Far from dropping it, we are still developing Econet and will continue to develop and support it for quite some time", said a spokesman.

Right on target

GLIDING instructor Alan Spellman found the calculations he had to do whenever he wanted to fly too time-consuming for words.

So he combined his business with pleasure and produced a computer program to do the work for him.

Six months of effort produced Navicom, a flight navigation program for BBC Micros and Masters. It is designed for use with all small aircraft.

Part of the package is a database which includes details on nearly 750 airfields in the UK and Ireland.

The program calculates heading, groundspeed, drift and time of journey, as well as fuel consumption and range.

There are several conversion functions, for instance between miles, nautical miles and kilometres, plus weight and temperature.

Once the flight plan has been worked out it can be saved to disc and printed out in an appropriate form.

Spellman, who has 18 years experience with gliders and eight with light aircraft, has now decided to sell the program. Price £29.95 on disc and £19.95 on cassette – without database.

Music Micro please at the Show

A LEADING exponent of linking BBC Micros to electronic musical keyboards will be taking over the stage throughout the May Electron & BBC Micro User Show in London.

Mike Beecher, a musician and teacher with 25 years experience of synthesised music, will be unveiling a revolutionary package he claims will add new dimensions to computer-controlled music making.

With him on stage each day of the show will be sophisticated Midi equipment, keyboards, drum machines and sound-sensitive graphics programs – originally developed for such pop groups as Ultravox – to help demonstrate the creative power of his innovative hardware and software.

As well as his Scorewriter package – which allows a 64-part musical score to be created on a BBC Micro – Beecher will be demonstrating software that can turn a £200 keyboard into a symphony orchestra.

Beecher began applying computers and electronics to music-making in 1980 and his company, Electromusic Research is now regarded as the leader in its field.

"What I am doing now is making it possible for people to create sophisticated music in their living room", he says.

The Electron & BBC Micro User Show is at the New Horticultural Hall, Westminster, from May 8 to 10.

A money-savng advance ticket order form appears on Page 6 of this issue.

NEWS

AN interface which aids computer control and monitoring on the BBC Micro and Master has been produced.

Connect3 from Phobox Electronics can been hooked up to construction kit motors, four at a time.

It is also compatible with popular schools control software such as Javelin, Bits, Control-It and Controller and can be driven from Basic programs.

The supply voltage can be switched between three, four, five, six, nine and 12 volts and the outputs can drive motors, lamps, relays and buzzers directly. Price £75.

phobox electronics
connect3
WARNING

Mini Micro module

A SPECIAL technique has enabled a standard-sized board to be developed which manages to cram on many times the usual number of components.

Cambridge Microprocessor Systems has launched the Euro-Microbeeb, a powerful micro module plugged into a standard 3U Eurocard.

Though looking conventional, the boards have three times as many surface-mount components on the underside as there are conventional components on top.

CMS says one of the main applications for the product is as a complete development package for BBC Micro, IBM or other computer terminals.

Programs can be developed with the Eurocard connected to the terminal.

When programming is completed, the micro-module can be unplugged from its carrier and attached to the application, a feature which CMS claims is unique.

On board is a full-colour video, rom filing system, BBC/CMS serial filing system, four analogue input channels, three serial channels, real-time calendar clock and 64k of CMOS battery-backed ram.

The carrier provides an RGB video connector, Centronics printer port and serial connector.

Languages supported include BBC Basic, CMS Multi-Basic, an Assembler/Disassembler, Forth and Pascal.

Sir Clive regrets . . .

SIR Clive Sinclair is still miffed over the BBC's decision six years ago not to use his company for its schools computer project.

He was still complaining about the choice of Acorn recently when he called the move "outrageous".

Despite the success of the BBC Micro project and the loss of his firm, he apparently still can't let the matter drop.

"We were the most successful company at the time. Losing the BBC contract was very damaging. We lost a large Japanese deal after that", he said.

The BBC explained it had gathered specifications from education experts and then took the package to seven companies.

Six made offers, and the decision to give the contract to Acorn was made purely on technical grounds.

Colour galore

NEW boards which claim to bring 4096 colours to the BBC Micro and Master are being released by newcomers Saturn from the West Midlands.

The Saturn Palette Extension (SPX) board can redefine colours in all modes.

The Master version of the board, due out this month, will allow very rapid switching of palettes, increasing the number of colours available on screen at one time, say the makers.

The software, supplied on 16k rom, drives the board from Basic, machine code and other languages which allow star commands.

The Model B version costs £50. The Master board will cost £60.

A REPAIR service for owners of all BBC machines has been launched by Heywood-based company Midcomm International.

Offering a professional service and using the latest diagnostic and test equipment available, the company has already attracted customers worldwide.

Says managing director Ian Catherall: "We consider our company to be an extension to the good name of Acorn and as such we offer the quality of service they would expect".

THE BROAD VIEW

A COMPLETE guide to Acorn's range of View software has been written by Clive Williamson, author of Getting The Most From Your BBC Micro/Acorn Electron.

Entitled Mastering View, Viewsheet and Viewstore it is the first book to cover the spreadsheet and database utilities, with information on how to link these programs with View by transfering data between them.

The book provides a guide to the peripheral programs such as Printer Drivers, ViewSpell and ViewPlot.

Advice on using disc drives and printers with the system is also featured.

Price £12.95.

3½" 'COMPACT' versions of CJE software available £2 extra.

CJE micro's

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Additional Font Disc MF 'B' contains:-
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For Canon & Taxan Kaga users we recommend FONTAID in preference to Multi-Font NLQ.

Multi-Font NLQ (ROM and 40/80 Disc)	**£30.00**
Additional font disc 'MF-B' (12 fonts)	**£15.00**
Additional font disc 'MF-C' (15 fonts)	**£15.00**
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NEW

MASTER Write Protect and ROM select switch.
Two switches set to RAM slots to be:-
Internal ROM or RAM Read and Write or RAM Read only.
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INFORM

A UNIQUE NEW POWERFUL USE FOR SIDEWAYS RAM

NEW

INFORM has been developed specifically to take full advantage of the Sideways RAM facility that many BBC micro users now have. Inform is compatible with most SIDEWAYS RAM units including ATPL Sidewise with RAM, Solidisc SWR, BBC B PLUS 128K & BBC MASTER series (not SDL256).

INFORM is a very powerful facility, which allows the user to display text information, of any kind, from Sideways RAM. This information can be readily accessed by using ** commands from the keyboard or from application programs. In this way, much information can be displayed on the screen without stopping the current task, such as entering text in WORDWISE or VIEW.

The information in the RAM can be changed dynamically at any time.

Some of the possible applications for INFORM are:–

An on screen help manual can be created for your application, so that a reminder about more obscure points can be displayed at the users request. Information on your program or datafile contents, can remind you of their purpose.

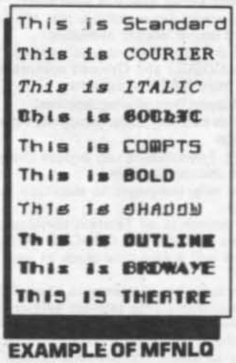
Address and/or telephone numbers can be held and displayed quickly even while other applications are running. Very useful if you need to quickly display information about a client while he is hanging on the end of a phone!

Current prices for your products or stock position can be recalled instantly and readily modified using a wordprocessor. Similar files may be created from most databases such as VIEWSTORE.

In fact, any information to which you frequently refer can be displayed immediately without running another program. Your use of INFORM is only limited by your imagination, as they say!
There are three Inform Data Files (I.D.F.), of often used information, supplied on the disk to give an indication of the use of INFORM.

To use INFORM you must have Sideways RAM.

INFORM on 40/80 track disc. P & P on INFORM £1.00 **£20.00**



This is Standard
This is COURIER
This is ITALIC
This is GOTHIC
This is COMPTS
This is BOLD
This is SHADOW
This is OUTLINE
This is BRDWAYE
This IS THEATRE

EXAMPLE OF MFNLQ FONTS

FONTAID

ENHANCED!

NLQ Definer for Canon & Taxan Kaga NLQ Printers.

Design your own NLQ Fonts or 'download' one of our 40+ predefined fonts.

Fonts can be downloaded within Wordwise, Inter Word or VIEW Documents allowing different fonts to be used for different paragraphs, or even individual lines of text. During downloading your Program or Text will not be corrupted.

On the FONTAID standard font Disk are the following eight fonts:- Square, Outline, Italic, Gothic, Computer Type Style, Bold, Shadow, and Broadway Engraved.

Additional disc 'A' gives an extra 11 fonts including:-
Greek/Maths, Plain, Hand & (Elite, Condensed, & Super Condensed).

Now included is a facility to issue * commands within a VIEW document.
To download new fonts within VIEW documents, the FONTAID ROM needs to be fitted in the BBC. (All other FONTAID facilities are available on both the FONTAID ROM & DISC). Fonts are always downloaded from Disc.

Fontaid is recommended to Canon & Taxan Kaga owners in preference to Multi-Font NLQ. As downloadable NLQ is a built-in facility of the Printer, full access to all the printers control codes is still allowed. The resolution of the FONTAID NLQ is also slightly higher than that of Multi-Font NLQ.

FONTAID requires 6264 RAM chip in printer.

FONTAID ROM & STD Font disc	(40 or 80 track)	**£30.00**
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BBC Cable	**£ 8.00**

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C.J.E. BBC Printer Packs are £15.00 cassette (£16.00 disc)
(e.g. Kaga KP810 with Printer pack £260 + £15 = £275 everything included)

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CJE micro's

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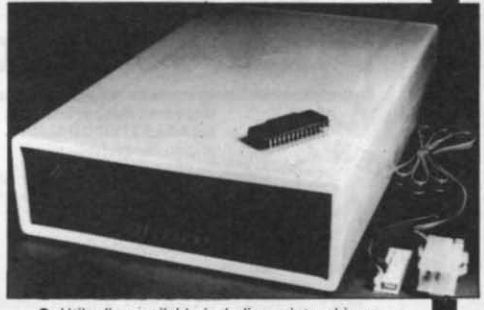
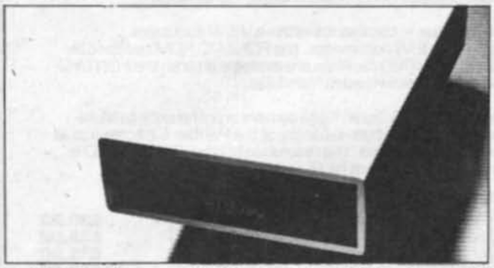
For technical details please ring Morley Electronics on Tyneside (091) 262 7507 after 4.00pm

FEATURES

- Advanced design uses the latest technology will handle ANY future enhancements to the Teletext system eg: full field: 8 bit data transfer: 2k pages etc.
- Simply plugs into the user port.
- Low power consumption, less than 200ma. Optional power supply available.
- User friendly menu driven software including extended OSCLI and Osword commands for access from BASIC programs.
- 16K Support Rom allowing extended commands including printer dumps etc. included in package
- FREE Telesoftware, no access charges. (at present updated weekly.)
- Save selected pages to disc/tape for later retrieval.
- Full access to all Teletext services and channels eg: CEEFAX, ORACLE, 4-TEL.
- Gives you a real-time clock at your disposal (*TIME).
- Free software upgrades to allow for any enhancements to the teletext service. Eg: extra channels, full field data on cable & satellite systems etc.
- Easy to follow comprehensive user guide.
- No hardware limitations, it can for example receive virtually unlimited numbers of channels.
- Works with Solidisc SWR.



- Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer (no more TV or Radio Times to buy)



Now available the first true MEGA capacity RAMdisc for the BBC or MASTER computers.

This fully compatible unit, currently available in either 1 or 2 megabyte versions comes complete with operating software on ROM, power supply, battery backup and a comprehensive user guide, add to this our usual 12 months no quibble guarantee and we're sure you'll agree Morley have done it again.

FEATURES

1 Megabyte of RAM connected to the 1 MHz bus.

Used with the supplied ROM software programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase in speed, for example, a 20K mode 0 screen takes about 3-4 seconds to load from disc and about 0.2-0.3 seconds to load from the RAMdisc.

The RAMdisc ROM operates as a utility ROM working with the current filing system rather than as a separate filing system. Therefore ensures compatibility with any Acorn compatible DFS (not ADFS).

The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive no. is 4.

'Dangerous' * commands such as *COMPACT, *COPY, *BACKUP etc are intercepted and the BBC's RAM from page 2 to &7FFF is saved to RAMdisc workspace, and may be recovered using a * command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The save operation delays the * command by just under 0.4 seconds. The BBC's RAM can also be saved by an interrupt-driven routine which can be enabled by a * command.

The 'filing system wedge' ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter, verifier and 'sector' editor for use with the RAMdisc.

Catalogue structure allows up to 2,709 files.

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INTERFACES DIRECTLY WITH ADAPTER allowing CEEFAX-ORACLE pages to be selected and dropped into editor screen for alteration, saving, or conversion to BASIC. Allows channel change from within program.

M/B software MASTER COPY

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using one or two, single-ro double-sided drives.

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Supplied on disc, MASTERcopy runs form sideways RAM and is invoked with a * command. The program re-installs itself in sideways RAM when copying is done, ready for later use.

The ROM image supplied can be used to blow your own EPROM too, for use in the MASTER's cartridge slots.

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80 TRK	☐	Qty. ☐ M/B DESIGN7 screen designer	@ £7.95 inc. VAT	Qty. ☐ Desfax	@ £23.00 inc. VAT
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NEWS

Micro's finger on the pulse

THE old adage: "Healthy mind, healthy body" acquires a new significance when BBC Micros are switched on at a dozen or so schools and colleges which have taken part in tests for a new project in monitoring body matters.

For an Essex schoolmaster has developed a range of body sensors which monitor functions such as pulse, temperature and breathing and work with computer programs specially designed for non-experts.

This deals with health while teaching intellectual skills.

Mr Christopher Smith, of Tabor High School in Braintree, has also produced a battery-driven data collector the size of a personal stereo system.

It can be programmed to monitor different body functions while giving the user freedom of movement.

The subject could then, say, run around the playing field, or complete some other task during which information could be collected for analysis later.

The project has been funded by the Health Promotion Research Trust and has been linked to the Biology, Health and Fitness curriculum scheme of the Association for Science Education.

But Mr Smith believes the equipment has potential for use in sports clubs, leisure centres and also among the growing number of people interesting themselves in health and fitness – now that it has proved itself in a trial run of several educational establishments.

VIEWFAX URGES CHANGE

VIEWFAX are trying to persuade software designers for BBC Micros to change their ideas about terminal programs.

The service is offering CEPT encoded telesoftware, which can be downloaded faster than with normal protocols. But another system, CET, virtually became standard. Now it seems, authors are reluctant to change their habits.

Viewfax deputy manager Igor Thomas explained that many Amstrad machines had been using CEPT for some time. This was because it became available before a standard was set on Amstrad modems.

"What Viewfax would like to see is many more software houses who work for the BBC Micros involving themselves in CEPT", he said

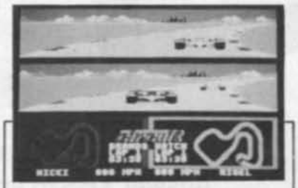
Games update

Ket trilogy

A TRILOGY for the BBC Micro and Master based on the Ket range of adventures has just been launched by Incentive Software.

The package incorporates three separate adventures, Mountains of Ket, Temple of Vran and The Final Mission.

Players must overcome Vran Verusbel and High Priestess Delphia in a bid to combat the attacks on the mountains of Ket. Price £9.95.



A NEW split screen car racing game with the possibility of tackling 18 circuits is promised soon for the BBC Micro and Master series.

Superior's Grand Prix Construction Set will sell for £9.95 on cassette, £11.95 on disc and £14.95 for the Compact version.

The 'big one'

LATEST release from Audiogenic is an arcade adventure for the BBC Micro.

Daxis is described as "the game of '87" and the company claims it will be the biggest BBC game since Elite.

According to Darryl Still, Audiogenic's product manager: "Daxis contains elements of everybody's favourites. It will have a similar appeal to Elite, with a lot of strategy involved, but also a lot of mindless blasting, so we feel it will appeal to everyone". Price £9.95 on tape, £12.95 on disc.

* * *

NEW for the BBC Micro, Master and Compact is an arcade shoot-out from Gremlin Graphics.

West Bank is set in Soft City, a Wild West town. Players must collect money from the citizens and shoot the baddies who try to steal it en route to the bank. Price £4.99 on tape, £7.99 on disc.

* * *

AWARD winning arcade adventure Starquake has been launched for the BBC Micro by Bubble Bus Software.

Recently awarded the Computer & Video Games' Golden Joystick, the game features 500 screens.

Price £9.95 on tape, £11.95 on disc.

TIPS for aspiring programming stars have been collected into a handbook by software house Superior as part of a spring campaign to recruit writers.

To coincide with the book's launch the company has released the first two in a range of Superior Collections for the BBC Micro. Each contains seven hits plus one new title.

Volume One features Syncron, Repton, Karate Combat, Star Striker, Airlift, BMX on the Moon, Wallaby and Smash and Grab.

Volume Two includes Kix, Repton 2, Deathstar, Space Pilot, Missile Strike, Battle Tank, Crazy Painter and Overdrive. Both are priced £9.95 on tape, £14.95 on disc.

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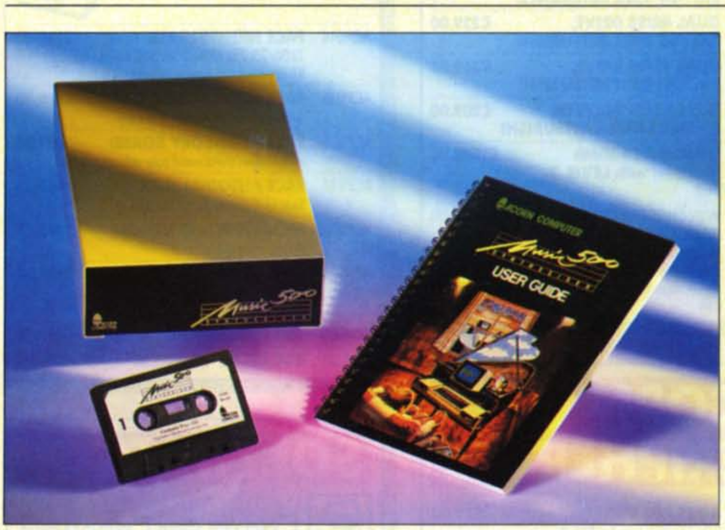

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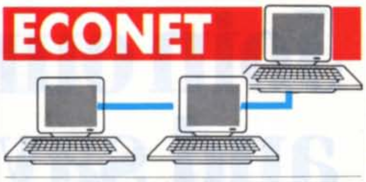

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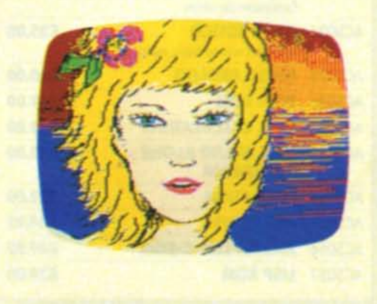

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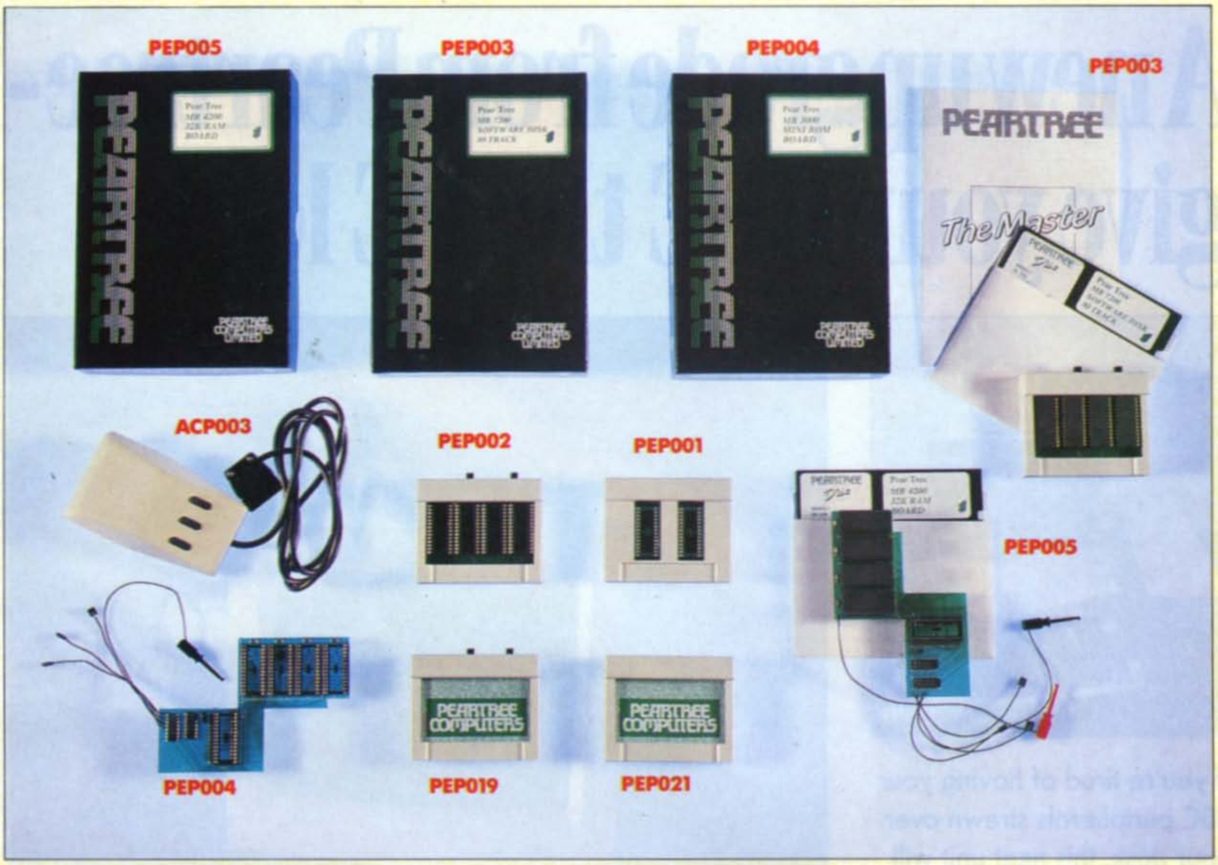

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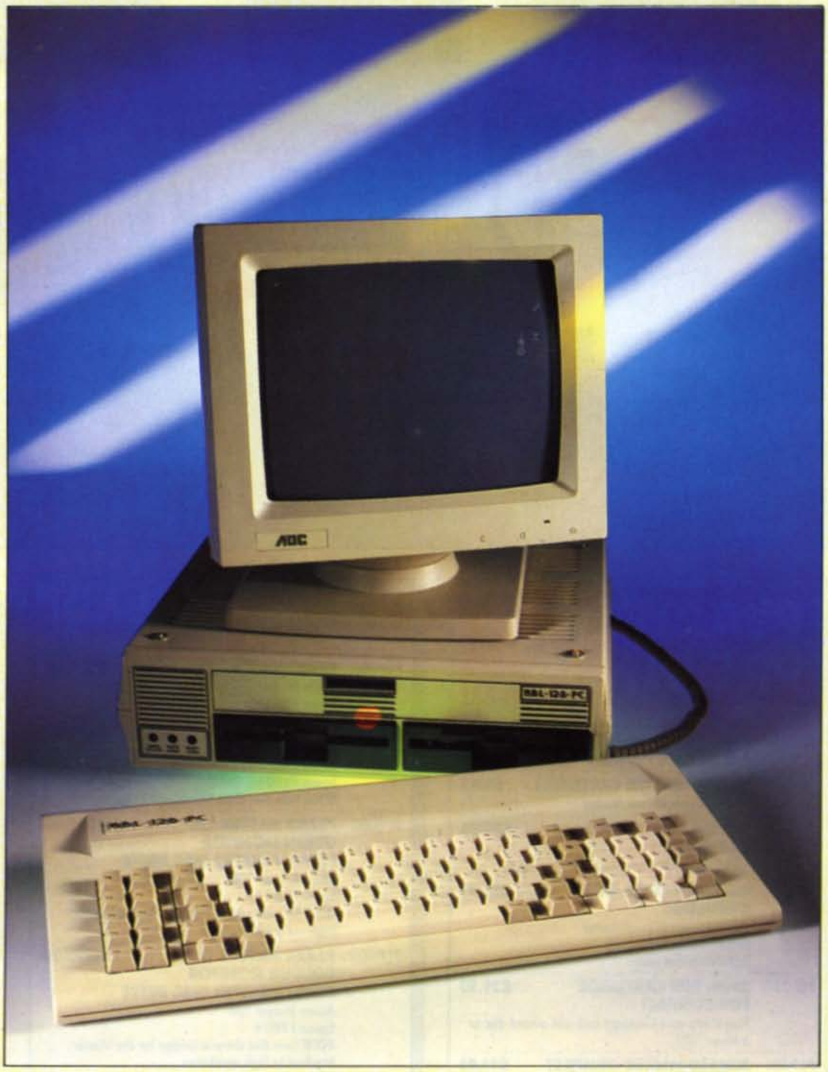

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SJ research

Steve Turnbull sorts out a matter of brackets and syntax

Braving the brackets in BBC Basic

To fully understand what these symbols mean you need to go back a long way, even past the history of computing. The story begins when people who studied language became interested in the theory of language and tried to produce a simple system of fixed rules for the syntax of natural languages – a subject which they are still trying to resolve.

Syntax means the rules for constructing the sentences in a language, for instance:

```
The boy eats an ice-cream
```

is correct by the rules of English syntax because it consists of a noun (the boy), followed by a verb (eats), followed by a noun (an ice cream), but:

```
The boy an ice-cream eats
```

is not correct (noun, noun, verb) – even though we would probably understand if someone said it. From this we can make a rule about simple sentences:

```
simple sentence = noun  verb  noun
```

When computers first came along, programmers just wrote in machine code or Assembly language, which had its own simple syntax rules. For instance:

```
add command = ADD number
```

Which means that to write an add command, we put in the word ADD followed by a number.

Breakthrough

Then the high level language Fortran was developed. This was the breakthrough that made it possible for "ordinary" people to program computers, a chance to give a computer instructions that were easier for the human to understand.

But behind this language was its syntax, the rules for writing the language, and these rules had to be known in order to write correct programs. At first these rules were very loosely defined, just a list of "You can do this . . ." and "You can't do that . . .", all very vague and woolly.

Try to imagine you wanted to learn to program in Basic, but the descriptions in the User Guide just consisted of the English description plus the notes and a couple of examples, then you can get a rough idea what the problems were.

> *"WHEN I type in *HELP DFS I get the list of commands followed by other things like (40/80), <afsp> or (<drive>). I understand what some of it means, but why are some things in round brackets and some in triangular brackets?"* – **Edward Strange, Stockton-on-Tees.**

What was worse were the ambiguities – some things could be taken two (or more) ways. To be fair on Fortran, modern compilers will spot errors and give warnings about things that it thinks might be wrong, but it is still very easy to get it wrong. (The classic story was an American rocket which crashed because the programmer put a space in the wrong place.)

So the next step for computer language specialists was "is it possible to invent a language where the syntax stops the programmer from making simple errors, instead of helping to cause them?"

The answer was yes, but what was needed first was a general way of describing the syntax of computer languages, a system that could be applied to any language. But it needs a big mental jump, from thinking in terms of a single language and its "sentences" up to thinking in terms of languages as one whole thing.

Call syntax

Figures I and II show examples of the two main systems of syntax description, all describing the same thing, the syntax of a BBC Basic procedure call.

Both systems are essentially the same, and involve the use of terminal symbols, non-terminal symbols and meta-language symbols. Now before you fall asleep, here is what those words mean.

A terminal symbol is a word like PROC

Turn to Page 24 ▶

```
<procedure call> = 'PROC' <proc part> ;
<proc part> = <identifier> [ '(' <real parameter list> ')' ] ;
<identifier> = <letter> { <letter> | <digit> } ;
<real parameter list> = <real parameter> { ',' <real parameter> } ;
<real parameter> = <variable> | <expression> ;
```

Figure I: Backus-Naur Form (BNF)

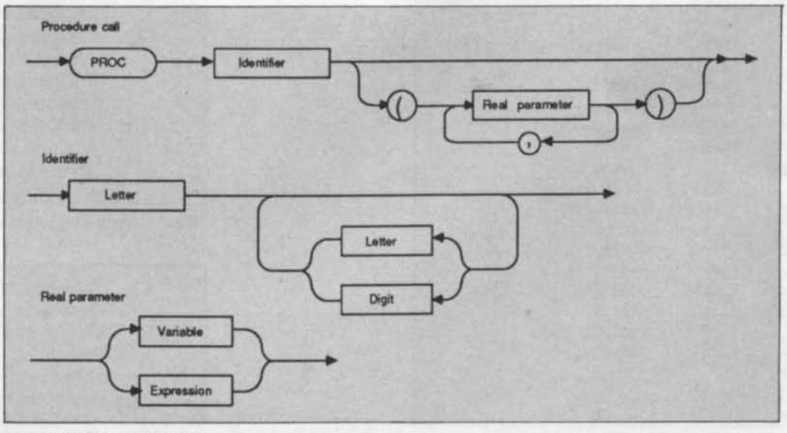


Figure II: Syntax diagram

◀ *From Page 23*

or AND, a punctuation mark like (or ,. A terminal symbol is any actual part of the language, it is called a terminal symbol because it "terminates", that means it cannot be sub-divided into anything else.

A non-terminal symbol is one which can be sub-divided further. For example in the Backus-Naur Form (BNF), <procedure call> is sub-divided into the terminal symbol PROC followed by the non-terminal symbol <proc part>, and <proc part> can be sub-divided into an <identifier> followed, optionally, by opening bracket, <parameter list> and a closing bracket. The <parameter list> is defined as . . . and so on.

New languages

The symbols used to describe the way the syntax for the language is put together, but are not actually part of the language, are called the meta-symbols, and together make up the meta-language. Table I shows what the meta-symbols for BNF are. In the word meta-language the prefix meta means going beyond, so meta-language means going beyond language.

Having invented their systems for describing languages the computer scientists went ahead and developed their new languages, such as Algol 68, Pascal, Simula and many others. These new languages made it possible to avoid most ambiguities and they were written with a proper syntax description.

By now you should be seeing the light. Type *HELP DFS on your BBC Micro, and look at the result, Figure III.

What you are given is the syntax for each DFS command, using a modified BNF form, plus some mistakes. Table II shows the modifications to standard BNF. But look at the *FORM and *DRIVE commands:

```
FORM 40/80 (<drive>)...
DRIVE <drive> (40)(80)
```

These two syntax descriptions are inconsistent and inaccurate. The *FORM command implies that you must have 40/80 in the command because there are no () to indicate options, and the *DRIVE command implies you can have:

```
*DRIVE 0 40 80
```

which is silly. They should be:

```
FORM (40/80) (<drive>)...
DRIVE <drive> ((40/80))
```

so that the *FORM syntax says you type either 40 or 80 after FORM, and in the *DRIVE syntax you can have 40 or 80 or neither, because the choice, (40/80), is itself optional, specified by the outer brackets.

Additionally, in the FORM command there must be a space between the (40/80) and (<drive>). . . otherwise an error is generated. So in the proper BNF form the commands would be shown as:

```
<format command> = 'FORM' ['40'|'80'] ' '
{ <drive> } ;
<drive command> = 'DRIVE' [<drive>]
[['40'|'80']] ;
```

The process of a computer program deciphering a line of input, either in a star command, a line of Basic or even an adventure game taking your instructions, is called parsing.

The computer follows its programmed route for syntax checking and when it hits an inconsistency between your input and what it understands to be correct an error is generated, such as "Syntax:" for the DFS error, "Missing"" for Basic, "I don't understand that" for an adventure game and so on.

That about wraps it up for syntax descriptions in roms, from the prehistory of computing up to date. And it just goes to show how closely your BBC Micro is in touch with main line computer software development. ■

```
DFS 2.0j
  ACCESS    <afsp> (L)
  BACKUP    <source> <dest.>
  CLOSE
  COMPACT   (<drive>)
  COPY      <source> <dest.> <afsp>
  DELETE    <fsp>
  DESTROY   <afsp>
  DIR       (<dir>)
  DRIVE     <drive> (40)(80)
  ENABLE
  EX        (<dir>)
  FORM      40/80 (<drive>)...
  FREE      (<drive>)
  INFO      <afsp>
  LIB       (<dir>)
  MAP       (<drive>)
  RENAME    <old fsp> <new fsp>
  TITLE     <title>
  VERIFY    (<drive>)...
  WIPE      <afsp>

OS 2.00
```

*Figure III: *HELP DFS*

' '	Encloses a terminal symbol.
< >	Encloses a non-terminal symbol
=	separates a non-terminal symbol from its definition.
I	separates different definitions of the same non-terminal symbol.
;	Ends the complete definition of a non-terminal symbol.
[ ]	Encloses an optional item.
[I I]	Encloses several items separated by I, of which one, but only one, must be chosen.
{ }	Encloses an item which may be left out, or may be repeated one or more times.
{ **I I** }	Encloses several items separated by I, of which one and only one may be chosen, but a choice can be made repeatedly.

Table I: Meta-language symbols for BNF

( )	Encloses an optional item.
/	separates a choice of item.
( )...	Means this option may be repeated any number of times.

No symbol to terminate a definition.
No quotes around terminal symbols.

Table II Modified BNF for BBC Micro

MICRO MEDIA Computer Supplies

0707 52698 or 0707 50913

Dept. MU Rydal Mount, Baker Street,
Potters Bar, Herts EN6 2BP

Printer Ribbons

Mixed types for quantity breaks

	2+	5+	12+
Acorn AP 80	2.70	2.30	2.10
AP 100	2.70	2.30	2.10
Ink Jet Cartridge	7.50 per pack of four		
Brother M1009	3.50	3.00	2.80
Red Brown Blue Green	4.95	4.65	4.25
HR 15 MS	3.30	2.90	2.60
HR 15 Fabric	3.40	3.00	2.70
Canon PW1156/1080	3.20	2.70	2.50
Red Brown Blue Green	4.70	4.20	3.90
Centronics GLP	3.50	3.00	2.80
Red Brown Blue Green	4.95	4.65	4.25
Daisystep 2000 M/S	2.90	2.40	2.20
Fabric	4.10	3.80	3.50
Epson FX/MX/RX 80	2.80	2.40	2.20
Red Brown Blue Green	4.00	3.30	3.10
LX 80	2.80	2.40	2.20
Red Brown Blue Green	4.00	3.30	3.10
Juki 5510	2.80	2.40	2.20
Red Brown Blue Green	4.00	3.30	3.10
6100 MS	2.30	1.90	1.70
6100 SS	1.40	1.10	1.00
2200 Fabric	3.60	3.30	3.10
2200 SS	3.00	2.60	2.40
2200 Corr	3.90	3.50	3.30
Kaga KP 810/910	3.20	2.70	2.50
Red Brown Blue Green	4.70	4.20	3.90
M/Tally MT 80 M/S	3.80	3.00	2.80
NEC PC 8023	3.60	3.00	2.80
Oki 80/82	1.50	1.20	1.10
Red Brown Blue Green	2.40	2.00	1.80
Panasonic KXP 110	3.90	3.40	2.90
Quendata 2000 MS	2.90	2.40	2.20
Fabric	4.10	3.80	3.50
Seikosha GP80	2.70	2.30	2.10
GP100/250	2.70	2.30	2.10
GP500	3.70	3.10	2.90
Red Broiwn Blue Green	4.90	4.60	4.20
Shinwa CP80 M/S	3.80	3.00	2.80
Smith Corona			
D100/200	4.90	4.50	4.00
EL1000/2000 M/S	8.30	7.70	7.00
Fabric	3.70	3.40	3.30
Corr	4.80	4.50	4.30
Star Gemini 10x 15x	1.50	1.20	1.10
Red Brown Blue Green	2.40	2.00	1.80
NL 10	5.50	4.80	4.50
Walters WM80 M/S	3.80	3.00	2.80
2000	3.70	3.30	2.90

If the ribbon you require is not listed ring 0707 52698 and let us quote

Head Cleaners

Discs with 15ml cleaning solution

5¼" Head Cleaner	4.00
3½" Head Cleaner	5.00

Printer Leads

Centronics lead to connect BBC to Epson Kaga Canon etc.

1 MTR	6.30	2 MTR	8.50

Printout Binders

Adjustable hardback ring binder for 11x9½ to 12x9½ cont paper 40mm paper capacity

BLUE RED or BLACK	£4.90 each
set of 5 indexes	£2.30

Disc Mailers

Price each	50+	100+
Rigid Cardboard holds up to 3 discs	40p	28p

Swivel Bases

for Monitors

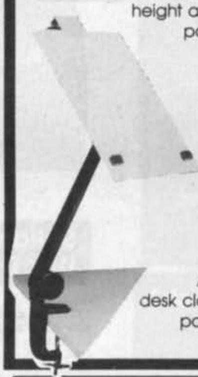
Pan tilt revolves around 360°
12.5° tiltable up and down
adjustable by front mechanism.

12" Monitors	**£12.00**
14" Monitors	**£15.00**

Adjustable Copy Holders

A4 Adjustable desk clamping. Magnifying cursor line paper height adjustable clip, paper thickness adjustment.

£20.90



A4 Adjustable desk clamping. Plate positioned 360°.

£13.90

Printer Stands

5mm clear perspex
405 x 325 x 100mm

80 column printers	£19.90
132 column printers	£24.90

Micro Media Brand Universal 5¼" Discs

Reversible with 2 notches and index holes. Lifetime guarantee, hub rings, envelopes, labels. Suitable for 40 or 80 track. Packed in plastic library case.

10+	30+	50+
9.40	**8.90**	**8.50**

Unbranded 5¼" Discs

Certified lifetime warranty
hub rings, envelopes, labels

Prices per 10 Discs

	10+	**30+**	**50+**
SS/DD 40	6.50	6.00	5.50
DS/DD 40	7.50	7.00	6.50
DS/DD 80	8.50	8.00	7.50

Unbranded 3½" Discs

Lifetime Guarantee/label sets

SS/DD	17.00	16.00	15.00
DS/DD	19.00	18.00	17.00

3M 5¼" Lifetime Guarantee

SS/DD 40	10.30	9.90	9.60
DS/DD 40	12.50	12.20	11.90
DS/DD 80	15.20	15.20	14.90

3M 3½" Lifetime Guarantee

SS/DD	20.50	20.30	20.00
DS/DD	25.50	25.30	25.00

Verbatim Datalife 5¼"

SS/DD 40	11.70	11.40	11.10
DS/DD 40	14.70	14.,40	14.10
DS/DD 80	19.70	19.40	19.10

Computer Labels

Continuous fanfold, sprocket fed

Price per 1000	1,000	2,000
70 x 36	4.20	3.80
89 x 36	4.30	3.90
89 x 49	5.90	5.30
102 x 36	4.50	4.20

Please state no. of labels across the sheet (1, 2 or 3).

9½" Backing Sheet for Fixed Tractor

	1,000	2,000
70 x 36 3 across	4.20	3.80
89 x 36 2 across	6.60	6.30
102 x 36 2 across	6.70	6.40

Computer paper

Plain fanfold, micro perf edges

Size	Weight gsm	1000's per box	Price per box 1 box	2 bxs+
11x9½	60	2	14.40	13.60
	80	2	17.80	16.30
EXACT A4				
11⅔x9¼	70	2	24.00	21.30
	90	1	15.20	12.70

A4 Fixed tractor paper available

Disc Boxes

	1	3+
MM 100 5¼ x100	11.70	10.00
MD 100 5¼ x100	11.70	10.00
MM 50 5¼ x50	8.70	7.90
MD 50 5¼ x50	8.70	7.90
MM 40 3½ x40	8.50	7.40
Rexel Mini Disc Box	5.00	
Plastic Library Case	3 for 4.00	

All MM/MD boxes anti-static with lock

● Educational and HMG orders accepted. ● Trade enquires. ● Personal callers welcome. ● Open Sat 10am - 4pm

Orders despatched. 24 hrs. Please allow 5 days for delivery. For next day delivery please ring for details. Postage covers UK only.

ALL PRICES INCLUSIVE OF
POSTAGE & PACKING

Please add VAT at 15%

VISA

24-Hour Credit Card Orders

0707 52698

-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-

Solidisk Technology

SOLIDISK MASTE

If you want to upgrade your BBC B to a Master, why not use our MASTERPLAN? We buy in your Beeb and sell you a brand new MASTER: you pay only the difference.
Fill in the blanks below to help you cost the project:

Acorn Master 128K, brand new cost 499.00

BBC Model B, issue ...., trade-in worth ☐
(issue 2 = £131, 3 = £191, 4 = £187, 7 = £225)
DFS, memory and other add-ons, trade-in ☐
(We accept only Solidisk and Acorn add-ons
Reging for valuation)
Total cost of MASTERPLAN project ☐

Masterising

If you are not yet ready to upgrade to a Master, why not Masterise? All you have to do is add Shadow Ram, Sideways Ram, the Real Time Clock and ADFS disk filing system — all available from Solidisk at good prices. You do not have to purchase them all of course, and they will not turn your Beeb into a Master (no numeric keypad or Rom slot, for example), but all the essential features are there and the solution could be well worth your while.

Real time Clock, Yes: £29, No: nil ☐

1770-DDFS plus ADFS, Yes: £55, No: nil ☐

DFDC plus ADFS, Yes: £60.00, No: nil ☐

(Twomeg) 128K RAM, Yes: £60.00, No: nil ☐
(other options include Twomeg 32,
Twomeg 256, Fourmeg 32 and Fourmeg 256)
Total cost of MASTERISING project ☐

Solidisk Real Time Clock:

The Real Time Clock and Calendar (RTC) can be plugged into any ROM socket on the Beeb with absolutely no other connection to make. It is powered by a rechargeable NICAD battery which should keep the RTC active throughout the Summer holidays.
Star commands include: Alarm, Bell, Boot, Configure, Dalarm, Noclock, Roms, RTC, Settime, Show, Status, Time and Unplug. FX161 and 162, Osword 14 and 15 are similar to the Master 128. It is also compatible with Basic 4's TIME$.
The RTC has many of the autoconfigure features of the MASTER with the same command syntax: Caps/Nocaps, data, delay, Fdrive, File, Ignore, Lang, Loud/Quiet, Mode (0-135), Boot/Noboot, Dir/Nodir, Time/Notime, Printer, Repeat, Rx, Scroll, Tube, Tv, Tx. If your Beeb has an AMX mouse, the RTC offers a DESKTOP and a CALCULATOR, just like GEM!

Order as RTC	*£29.00*

Solidisk Dual Density Disc Systems:

Solidisk offers two types of disk filing system, with a choice of two Rom types. Both are based on the Western Digital WD1770 chip — the standard not only for the BBC model B, but also the BBC +, Master, Compact and ADFS. Both are fully compatible with Acorn Roms, offering complete solutions to the problems of updating the BBC, based on 1770, 8271, DFS and ADFS systems.
Not only is our range therefore unequalled, but also the features it offers; if you don't believe us, check other makes before you buy.

Which DFS?

WD-1770 DDFS Disk Interface:

If your Beeb has not yet been upgraded to disc, then the DDFS is the right choice. It is certainly the most popular version on the Beeb and easy to fit. Use with Acorn or Solidisk Roms to give compatibility with any 40/80 track drive, with or without PSU.

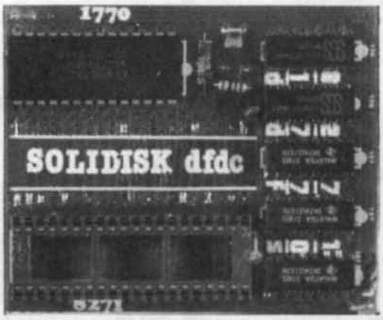
New low price without Rom	*£35.00*
With STL 2.2 ROM (see below)	*£45.00*
With STL 2.1 ROMs (see below)	*£55.00*

BEEB Model B

WD-1770+8271 DFDC Disk Interface:

If you already have an 8271 based DFS from Acorn, Watford Electronics, Pace, Cumana or Viglen, this is the only way to add the WD-1770 to your system. Fully compatible with the Acorn DNFS1.20 ROM for the 8271 and Acorn ADFS for the 1770. Allows the Acorn chip set to self-erase, keeping memory requirements (and PAGE) at a minimum. For maximum performance, use the STL 2.2 Rom (for both 8271 and 1770). If ADFS is required, use Acorn DNFS1.20 ROM (for your 8271) with the STL 2.1 Romset (for the WD-1770). The last combination will still allow self erasure, and will add single and double density, cross format file copy, ADFS as well as NFS. In other words, everything imaginable with the Beeb.

New low cost DFDC without Rom	*£40.00*
DFDC with STL 2.2 Rom	*£50.00*
Special offers:	
DFDC with STL ADFS 2.1 Romset (see below)	*£55.00*
DFDC with STL 2.2 DFS and 2.1 (3 Roms)	*£63.00*



Which ROMs from Solidisk?

STL DFS 2.2 ROM:

Runs with both 8271 and WD-1770 chips from Acorn, Watford and Opus, and 1770 from STL, and offers the following features:
★ 40/80 track software switching ★ unlimited catalogue entries ★ automatic Read after Write for media security ★ runs with Z80, 6502 and Econet ★ more commands than any other DFS including FORMAT in 40/80 track, VERIFY, DZAP, MZAP, RECOVER, RESTORE, WORD, RTRACK, WTRACK, DSTEP, ETC ★ when used with the WD-1770, reads disks in single and double density and IBM format ★ 60 per cent free extra storage space in double density (640K per disk compared with Acorn's 400K) ★ more speed and bigger file size.
Supplied on one 16K Rom with manual

Order as the DFSR2	*£20.00*

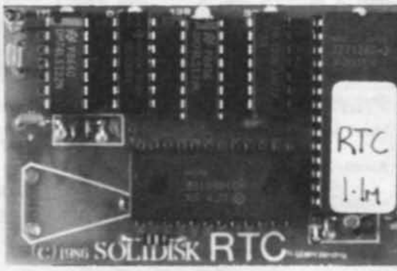
PLEASE SPECIFY WE/OPUS/MASTER/COMPACT as applicable.

The ADFS 2.1 ROMSET:

This double ROM set has all the commands of the STL DFS 2.2 Rom but runs ony with the 1770, not the 8271 system. It has many more besides, including all the commands in the Acorn ADFS Rom.
PLUS: ADFS disk formatter (for 40, 80 and 160 tracks) and VERIFY ★ MVADFS and MVDFS to transfer cross format disks between DFS and ADFS with automatic PAUSE for disk change when using a single drive ★ user specified (1 to 10) number of file channels to keep PAGE to a minimum ★ runs with the Z80, Turbo, 32016 and the new 80186 PC compatible upgrade.
Supplied on two 16K Roms or one 32K with two user manuals

Order as ADFSROM 2.1	*£30.0C*

PLEASE SPECIFY WE/OPUS/MASTER/COMPACT/16K OR 32K as applicable.



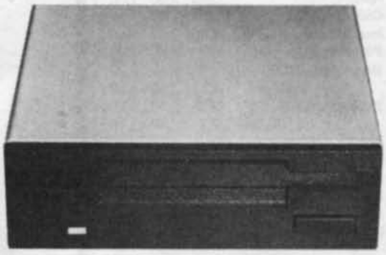
Real Time Clock

Solidisk FD35 3.5″ Disc Drive:

This is a superb 80 track, double sided, dual density drive, also useable on the ATARI ST. You get up to 640K maximum per disc (800K with the 80186) and at its price, you are guaranteed of extremely good value. Comes with demo disk.

Order as FD35, single drive	*£100.00*
Order as TFD35, twin drive	*£200.00*
Order as ADFS16 for the Compact	*£113.85*
Separate PSU if required (PSU/35)	*£25.00*

Recommended media:
Sony Double Sided, double density, 135 TPI or equivalent (£29 per box of 10).



Solidisk FD525 5.25″ Disc Drive:

This is a superb 80 track, double sided, dual density drive and very fast. You get up to 640K maximum per disc (800K with the 80186 board), 40/80 manual switch is optional as most Acorn DFS ROMs and Solidisk's have automatic 40/80 track software switch.

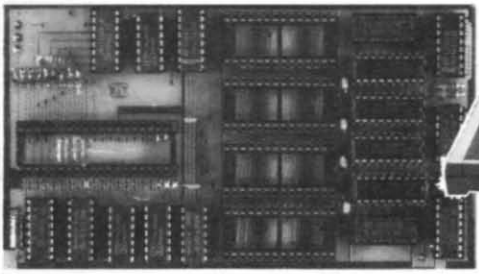
Order as DF525, single	*£119.00*
Order as TFD525, twin in a bridge	*£228.00*
Orders as TFD525/CPU, twin in the CPU case with detachable keyboard case for Beeb	*£239.00*
Separate PSU if required (PSU/525)	*£25.00*
40/80 track manual switch optional	*£2.00*

PLEASE SPECIFY SWITCH/MASTER/COMPACT/ELECTRON if applicable.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (16 lines).

RISE YOUR BEEB!

Solidisk Technology



TWOMEG 128

New: The Twomeg 128K board

Solidisk has always been closest to emulate the MASTER 128K. The Twomeg 128K features 64K of Sideways RAM in four banks: 4, 5, 6 and 7, selected by a single latch at &FE30 for both read and write exactly like the Master. The remaining 64K is more versatile and can be used as four more Sideways RAM (12, 13, 14 and 15) or as Shadow RAM and a 24K printer buffer (good news for wordprocessor users).

The new Twomeg 128K will run Computer Concepts Interword, Sheet and Spellmaster, Acorn View 3.1, Viewsheet, Viewstore, Basic etc.
A clever switch write-protects only the 8 banks of Sideways RAM without affecting the Shadow RAM and the Printer Buffer.
Ramdisk is not forgotten, you can have one in ADFS (if you have Solidisk ADFS) or in DFS for both 8271 and 1770 disc controllers.
Four extra ROM sockets are available directly on the Twomeg 128K board, numbered 8, 9, 10 and 11. Four ROM sockets on the Beeb are renumbered to 0, 1, 2 and 3.
Software is supplied on FIVE discs, containing Wordprocessor, Spelling Checker, Database, Macro Basic, Ramdisk, Menu, Manager etc. Software Pack 2 (five discs) is optional and contains many useful utilities for the machine code programmer. Software Pack 3 also optional, contains around 50 of Solidisk Megagames. List of all programs in these software packs is included in the Twomeg 128K User Manual. Fitting is extremely easy: just plug in the board into the CPU socket and push 3 terminals onto S20, S21 and S22. Internal logic produces chip select for the &FE30 latch. Free installation by local experts is available.

Order as 2MEG128	*£60.00*

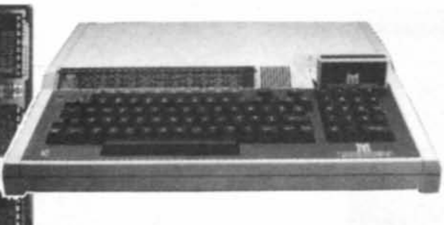
PLEASE SPECIFY /40 TRACK OR /80 TRACK FOR THE SOFTWARE PACK 1, included in the price.

Optional software Pack 2 or 3 (five discs)	*£10.00*

Detachable Keyboard and CPU case:

This 'three box' casing system will help you to organise your desk and improve comfort. The keyboard features the lowest profile (maximum height of any key is 47mm) and does not skid. Typing angle is 2-3 degrees better. The monitor sits on top of the computer. Pure metal construction provides EMF shielding against phantom keyboard interrupt and accelerates heat dissipation (no messy metal strengthening over plastic). Keyboard lead is 24" long.

Order as K/CPU case, special offer price while stocks last	*£25.00*
Note:	
Post and packing	*£6.00*



MASTER 128

The Fourmeg 32K board:

The Fourmeg 32 is a ROM expansion board on its own with up to 224K of installable firmware. It also is the FASTEST shadow RAM board around (it runs at 4 MHz while others run at 2 MHz, including the MASTER), and the fastest Sideways RAM board. It consumes also less power than any other ROM RAM board through the extensive use of CMOS devices.
The top row of five ROM sockets will take software ROMs, up to 32K each, such as used on the Beeb Plus, the MASTER or the Compact. They are high speed sockets.
The middle row contains 40K of high speed CMOS static RAM chips, acting as a Shadow RAM and a printer buffer or as two banks of Sideways RAM. Write-protection of Sideways RAM is performed by separate Read and Write registers with automatic write-protect when one presses the BREAK key.
The CPU is a 4 MHz, CMOS technology, GTE 65C02, similar to the one on the Turbo board, replacing the existing 6502.
The Fourmeg 32K is also upgradable, once more by the latest CMOS technology: 62256, 32k RAM on a single chip which plugs into one of the high speed ROM sockets.

This board is designed such that one can have everything required on a single, compact and easy to install unit. All the necessary software is in a MANAGER ROM (supplied). Star commands include: Shadow, Ramdisk, Ramoff, Ramdfs, Ramadfs, Ramdrive, Testram, Plus. A complete toolkit to assist programming in Basic is also included: Hardbreak, Join, Keyload, Keysave, Kill, Lvar, Menu, Msearch, Mzap, Page, Printer, Rcat, Number, Report, Rload, Rwipe, Salvage, Status, Sound. One year guarantee.

Order as FOURMEG 32	*£70.00*
Additional 32K chip (optional)	*£15.00*
Software packs 1 to 3 (optional), each of five disc	*£10.00*

The Fourmeg 256K board:

The Solidisk Fourmeg 256 board combines high CPU speed (4MHz GTE 65C02) with large memor size (256K Dynamic RAM, 8K static RAM) and powerful supporting software (32K MANAGER ROM). It offers four ROM sockets featuring high speed and high capacity (up to 64K ROM per socket), 8 shadow RAM banks, 8 Sideways RAM banks or even both.

Order as Fourmeg 256K	*£135.00*

NOTE: NO MORE ROM BOARD TRADE-IN IS ALLOWED AFTER 1ST MAY 87.

Wordwise Plus or Interword Special Deal:

If you buy Wordwise Plus or Interword together with a Twomeg or a Fourmeg board, you get extra special discount!

Wordwise Plus (bundle only)	*£30.00*
Interword (bundle only)	*£50.00*

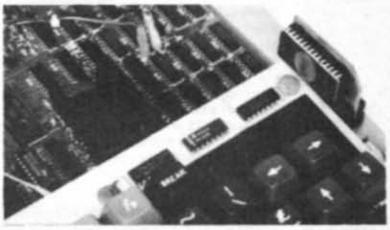
Special Offers on Sideways RAM boards:

These exceedingly popular systems (40,000 plus units sold) enables the Beeb users to load ROM images into the Beeb, make a 16K printer buffer, use DFS with PAGE at &E00, play Solidisk Megagames, bigger Basic (Vstore), store music and inumerable other uses as supported by a library of 15 software diskettes.
They consist of a base unit plugging into the rightmost ROM socket on the Beeb and an exchangeable RAM card with capacity ranging from 32K (two Sideways RAM banks) to 128K (8 Sideways RAM banks). They are now made available to you at less than half their normal price, all offering extremely good value. One year guarantee, supplied with User Manual and one software disc.

SWR32, 32K RAM, disc No 1	*£20.00*
SWR64, 64K ROM and two 16/32K ROM sockets, Disc NoI	*£30.00*
96K Extension for SWR 32	*£25.00*
SWR128 (new style), 128K RAM, two 16/32 ROM sockets	*£45.00*
Software Packs 1 to 3, each of five discs, any pack	*£10.00*
Any disc volume 1 to 15 each	*£2.00*

PLEASE SPECIFY /40 TRACK OR /80 TRACK as applicable.

Electron Disc Interface:	*£50.00*
BABT approved Modem plus Linemaster ROM	*£30.00*



EPROM Programmer:

The UVIPROM is the cheapest Eprom programmer on the market yet the easiest to use, will program 2764 EPROMS in one minute and 27128 in two minutes.
A different version called the UVIPROM32 will program 27256 EPROMS in 4 minutes.
The MULTIPROM is the Deluxe version, combining the capacity of the UVIPROM and the UVIPROM32 and some other features. Use it to program 2764, 27128 (normal and A type), 27256 (12.5V and 21V), 27512, 27513 etc. Textool 28 pin ZIP socket fitted as standard.

UVIPROM plus disc No 10	*£20.00*
UVIPROM32 plus disc No 10	*£20.00*
MULTIPROM plus disc No 10	*£44.50*
UVIPAC Eprom Eraser	*£20.00*
2764 EPROM each £2.00, ten for	*£16.00*
27128 EPROM each £4.00, ten for	*£34.00*
27256 EPROM each £7.00, ten for	*£63.00*
Panasonic KX-P1081 Special Offer:	*£149.00 + VAT*

IMPORTANT NOTICE: TRADE-UP

Solidisk will accept return of memory boards up to ONE YEAR old for TRADING-UP. The selling price (below) is the price we sell the same goods at the time of the trade-up transaction.

Age	**Trade-up allowance**
Up to 3 months	90% of selling price
Up to 6 months	85% of selling price
Up to 9 months	80% of selling price
Up to 12 months	75% of selling price

If the balance of the upgrade is less than £15, a minimum charge of 15 is made.

****

As a result of our MASTERPLAN, we have a number of BBC Model B's for sale every day. All are fully inspected, reconditioned if necessary, and guaranteed. All have a new DDFS fitted as standard. We also buy second-hand Beeb for cash. See our price list for details.

****

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (16 lines).

NEW BRANCH IN BRISTOL OFFICIAL DEALER IN AVON

System One

System One: COMPACT now with 5.25" drives:

The System One consists of a Master Compact 128K, twin disc drives, optional monochrome or colour monitor, optional printer. Solidisk will give you free our own CDFS 2.1 ROM, a Dual Density Beeb Disc Filing System featuring disc sector editor (for both DFS and ADFS discs), MVDFS and MVADFS for cross format file transfer, disc formatter and verifier etc. Some of the options include 5.25" drive(s) which we believe is a better choice than the 3.5" format. The 5.25" format is still preferred for the Master 128 (even now, with 80186 board) and on the Beeb. Cheap discs, better reliability, better software availability are some of the key advantages. Don't buy single drive systems because you can't make copy ADFS discs with a single drive.

Available options (all prices include VAT):

A — Compact 128K with Acorn 14" Colour monitor, CDFS, twin 3.5" drive, one demo disc containing Solidisk Database, Spelling Checker and Megagames (as illustrated): £749.00
B — as above but with one 3.5" drive and one 3.5" drive and one 5.25" drive: £748.00
C — as above but with twin 5.25" drives in a bridge unit: £759.00

Monochrome Option:

All systems above (A, B or C) can be supplied with Acorn 12" monochrome monitor in place of the Colour monitor:-

A	£598.00
B	£597.00
C	£608.00

P-1081 Printer option: £171.45

Buy the Panasonic KX P1081 NLQ/Super NLQ printer with a System One. At £171.45, you just can't afford to let this latest Japanese printer go. Special reduced price at only £149.00 + VAT.

SPECIFICATIONS

Print Method	Impact Dot Matrix
Print Speed (cps)	Draft 120 NLQ 24 Compressed 102
Print Mode Selector	Standard/Program, Near-letter quality, Compressed
Print Direction	Bi-directional with logic seeking (Uni-directional in bit image mode)
Print Head	9 pin
Print Head Life	100 million characters
Line Spacing	⅙", ⅛", 7/72", n/72", n/216" (programmable)
Line Feed Speed	100 ms (per ⅙")
Character Set	Full 96 ASCII characters with descenders, italic, 32 international characters (11 Countries), IBM* special characters, IBM block graphics
Character Structure Draft NLQ Block graphics	HOR × VERT 9 × 9 18 × 18 6 × 12
Bit Images (Dots/inch)	60, 72, 80, 90, 120, 240 (120 can be used in standard or double speed)
Printing Sizes Draft/NLQ Double width Proportional Spacing	Characters per inch: Pica / Elite / Semi-Comp / Comp 10 / 12 / 15 / 17.1 5 / 6 / 7.5 / 8.5 Variable Characters per line: Pica / Elite / Semi-Comp / Comp 80 / 96 / 120 / 137 40 / 48 / 60 / 68 Variable
Paper Feed	Adjustable rear tractor feed and friction feed
Paper Width	Fanfold paper: 3" to 10" Single sheet: 4" to 9"
Number of Copies	3 (Original plus 2 non-carbon copies)
Interfaces Standard Optional	8 bit parallel RS-232C (DTR, X-ON/X-OFF or ETX/ACK —KX-P11D; DTR, X-ON/X-OFF—KX-P17)
Buffer Standard Optional	1 K text buffer 4 K text buffer (KX-P12)
Compatibility	RX-80™, IBM Matrix and Graphics Printers (Elite Pitch command of the Proprinter is also available.)
Noise Level	60 dbA
Reliability	MTBF 4000 hours at 25% duty (not including head life)
Environmental Conditions (Controlled)	Operating: 41°F to 104°F (5°C to 40°C)/20 to 80% humidity Storage: −4°F to 140°F (−20°C to 60°C)/10 to 90% humidity
Power Requirement	240 V AC ±10% 50 Hz 0.6 AMP
Dimensions (W×D×H)	15.9" (403 mm) × 11.2" (286 mm) × 4.5" (115 mm)
Weight	13.4 lbs. (6.1 kg)
Other Options	Color ribbons: Brown (KX-P111), Blue (KX-P112), Red (KX-P113)

*RX-80 is a trademark of Epson America, Inc.
*IBM is a registered trademark of International Business Machines Corp.

System Two

System Two: MASTER 12K with Twin 5.25" Drives in a Bridge Unit:

This system is our most popular, consisting of a fully blown MASTER 128K, twin 80 track, double sided 1.3 Megabyte Disc Drives in a bridge unit doubling as a monitor stand, free demo disc containing Solidisk Database, Spelling Checker and Megagames.

Available options (all prices include VAT):

A — As illustrated (without monitor) £670.00
B — with Philips 14" CM 8533 colour monitor (same construction as Acorn colour monitor) £865.00
C — with Mitsubishi 14" XC 1404 colour monitor £830.00

Special offers (if bought together with a System Two):

MP-165	£220.00
P-1081	£171.45
Master 80186, 512K Co-processor	£223.00
Acorn 20 MB Winchester	POA
Solidisk 20 MB Winchester (special issue, only with 80186 option)	£500.00

MP-165 Printer option: £220.00

The MP 165 is one of our best selling printers, featuring 165 cps in draft mode, 40-50 cps in NLQ, Epson FX compatibility, friction and tractor feed etc. Normal price is extremely attractive at £260.00 when you consider that the MP 165 is a lot faster than its rivals such as the Star NL-10, the Kaga KP-810, the EPSON LX86 or FX85 etc. We will cut £40 off the normal price and give you a free printer lead if you buy the MP-165 together with a System.

Special Offer £179.99

Panasonic KX-P1081

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MASTER SERIES:

AMB15	Master 128	499.00
ADB12	MasterET	399.00
ADC06	Turbo Upgrade	125
ADC08	80126/512K	228.00
ADF13	Eprom cartridge	14.95

MANUALS AND DOCUMENTATION:

ADJ22	Ref manual Pt 1	14.95
ADJ23	Ref manual Pt 2	14.95

MASTER COMPACT SERIES:

ADB20	Master Compact Single drive	441.25
ADB20+ADF30	Master Compact S/D with TV mod.	457.35
ADB20+ADF31	Master Compact S/D with Mono monitor	537.85
ADB20+ADF32	Master Compact S/D with Colour monitor	687.35
ADF15	RS232 kit	29.90
ADF16	Second 3.5" floppy drive	113.85
ADF17	PAL TV Adaptor	29.90

ACORN SOFTWARE:

SUB27	Viewstore database ROM	59.80
SUB18	Pascal	69.00
	FORTH	19.90
	LISP	19,90
	MICRO-PROLOG	79.95

SOLIDISK SOFTWARE ROMS:

PCFS	Compatible with PC and MS DOS discs	15.00
PCMAN	MANUAL FOR PCFS	5.00
CDFS	single and double density DFS ROM for the COMPACT	10.00
MADFS	DFS and ADFS ROM (32k) fur the Master	20.00
LMS	communication ROM for the Master	10.00
SOLIMON	Machine code monitor for Master/Compact	10.00
INSIGHT	Intelligent disassembler, XREF	20.00
UVP	Eprom programmer software (8k)	5.00

ECONET PRODUCTS:

ADF10	Econet plug-in	49.99
AEH17	100m Cable	99.00
AEH18	10station lead set	29.00
AEH19	Econet starter kit	99.00
AEH20	Econet bridge	199.00
AEH21	Econet socket kit	29.95
AES21	Level 2 Fileserver	249.00
AES22	Printer server ROM	49.00

DISC DRIVES:

FD35	3.5" 80-track double-sided single drive	£100.00
TWIN35	Twin DF35	£200.00
FD525	5.25" 80-track double-sided single drive	£115.00
TWIN525	Twin FD525	£230.00
20MB	Winchester new model, low cost SEAGATE	£700.00

PRINTERS:

LX86	EPSON LX86 + 2M printer lead	249.00
LXTF	LX80 Tractor Feed	31.30
LXCSF	LX80 Cut Sheet Feeder	53.53
FX85	EPSON FX85 NLQ + 2M printer lead	350.00
FXTF	FX85 Tractor Feed	30.59
FXCSF	FX85 Cut Sheet Feeder	123.50
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NLCSF	Cut Sheet Feeder for NL-10	59.99
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J6100	JUKI 6100 Daisy Wheel + 2M printer lead	340.00
JURIB	JUKI 6100 black vinyl printer ribbon	2.00
PAPER	2000 sheets cont. paper, A4 size 11" x 9.5"	14.00

MONITORS:

BM7502	12" Philips hi-res green screen, lead	85.00
BM7522	12" Philips hi-res amber screen, lead	86.00
CM8533	14" hi-res Colour Monitor, lead	299.00
TAXAN3	12" TAXAN Supervision 3, hi-res RGB Colour, lead	375.00
TAXAN2	12" TAXAN Supervision 2, Merdium-res RGB Colour monitor, lead	315.00
XC1404	14" Mitsubishi RGB colour monitor, lead	260.00

SOFTWARE PACKS:

SWPK1	5 software discs, 80 track. Database, spelling checker, machine code monitor, Macro Basic etc. 5.25" format	£10.00
	3.5" format	£15.00
SWPK2	5 software discs, 80 track. Games. 5.25" format	£10.00
	3.5" format	£15.00

DISKETTES:

MD525	5¼" low cost VEREX for all drives	.12.00
MD557	5¼" hi-rel MD557, Verbatim DSDD 96tpi	25.00
C102	3.5" low cost Verbatim for all drives	20.00
C103	3.5" hi-rel 90097M Vertbatim DSDD 135 tpi	28.00
C104	3" CF2/MSOFT for all Amstrad drives	39.00

CARTRIDGES:

ADF13	Acorn Eprom cartridge for two 27128	14.95
EPR32	Solidisk Eprom cartridge for one 27256	8.00
RAM32	Solidisk 32K RAM cartridge with battery backup and write protect switch	25.00
MEGA256	Solidisk 256K Mega-RAM card with RAM disc and printer buffer in ROM	100.00
MEGA256	Solidisk 1 Megabyte Mega-RAM card with RAM disc and printer buffer in ROM	POA
	Expected price in April/May	225.00

EXTRA DISCOUNT

If you buy a disc drive or a printer or a monitor at the same time you buy a Master or a Compact, you are qualified for SYSTEM DISCOUNT and a free Software Pack 1 (worth £10.00 or more).

Normal Package Price	System Discount	Reduction
£600-£699	3%	£18-£21
£700-£799	4%	£28-£32
£800-£899	5%	£40-£45
£900-£999	6%	£54-£60
£1000 and above	7%	£70-£££

Example of system		normal price	Discount	Net price
1	Compact Mono + MP165 printer	797.85	31.95	**765.94**
2	Compact Colour + Juki 6100	1027.35	71.89	**955.11**
3	Master 128 + twin F/Drives	729.00	29.16	**699.84**
4	Master 128, twin F/Drives, CM8533 Colour monitor	1028.00	71.96	**956.04**
5	example 4 + MP165 printer	1288.00	90.15	**1197-84**
6	Master 512 + twin F/Drives	957.00	57.42	**899.58**
7	Master 512 + twin F/Drives, plus 20 MB Winchester	1657.00	115.99	**1541.01**

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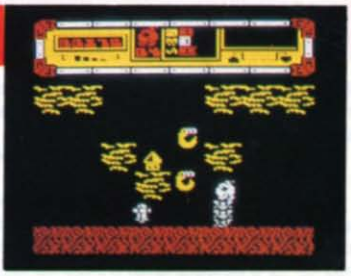
Starquake

★ ★ ★ ★



WITH so many adverts saying "Spectrum, Commodore and Amstrad versions available" it's all too easy to believe that some software houses have forgotten the Acorn machines.

But now there's Starquake from Bubblebus – a fine example of an explore-and-collect' arcade adventure game. It's also very big – 500 screens in all.

The game allows you to define your own playing keys, a very useful feature that's rarely seen. You are then presented with an impressive Mode 1 loading screen reminiscent of the Ultimate games. Full marks so far.

The appearance of the game itself reminded me very much of Sabre Wulf: A giant mappable maze, with all kinds of nasties appearing as soon as you enter, allowing very little time for logical thought. Thank heavens there's a pause facility.

Price: £7.95 (cassette), £11.95 (disc) Supplier: Bubblebus, 87 High St., Tonbridge, Kent, TN9 1RX. Tel: 0732 355962

I have not got very far with the game as yet. Although my pre-release version did not have much in the way of instructions, I wouldn't expect many in the finished article – part of the fascination of this sort of game is discovering what to do.

As far as I can tell, to finish the game you have to find nine objects lying around somewhere in the 500 locations and take them to a control room – so far I have only found it once.

To travel around it's best to commandeer one of the buggies which are dotted around the complex. There are also transporters which allow you to teleport around the maze.

You can move by yourself but doing so drains your energy at a fairly rapid rate. A generous supply of 'food' objects can be used to replenish your strength – believe me you'll need them.

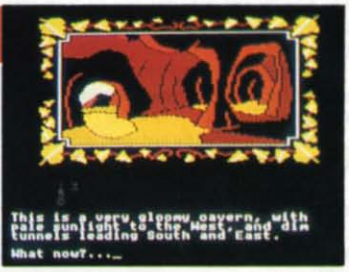
What makes the exploration of the game more difficult is that some places can be found only by buggy, but some gaps are so narrow that they can be investigated only on foot. And the nine important objects can be manipulated only while you are under your own steam.

After a not very promising initial impression I am now firmly hooked and every spare scrap of paper is being turned into a map of the game. Buy it – it's great.

Hac-Man

Winter Wonderland

★ ★ ★ ★



```
This is a very gloomy cavern, with
pale sunlight to the West, and dim
tunnels leading South and East.

What now?..._
```

WINTER Wonderland is the first adventure using the Graphic Adventure Creator to be released for the BBC Micro. I look forward to seeing other offerings of this standard.

The setting is an interesting one: You hear rumours of a civilisation which has developed in the Himalayas, quite separately from, but parallel to, our own. Off you rush to Lhasa, hire a Cessna and zoom away into the blue. The adventure commences after you have crash landed.

I must confess to being a text-only adventure fan, so once I had admired the picture of my crashed plane I was quite content to type in WORDS and start playing the adventure in that format.

I penetrated over 30 locations before I remembered to try PICTURES again, which demonstrates the holding power of the excellent text descriptions.

Scoring is based on percentage points for items collected and problems solved (about four percent an item), coupled with a move-counter. Thus, when you enter SCORE, you are given a percentage of the game achieved and the number of moves taken.

Price: £7.95 (cassette).
Supplier: Incentive Software, 2 Minerva House, Calleva Park, Aldermaston, Berks RG7 4QW. Tel: 07356 77288

This will allow those who have completed the game to work out the minimum moves required, then see if they are right. To my mind this is a useful feature in any adventure.

The start is excellent: I have often stated that an easy beginning is essential to any adventure if newcomers are to be attracted, and the authors have provided a perfect example without being boring.

Judicious use of the command EXAMINE is needed to reveal some objects, and careful exploration is essential as you progress. The parser allows for multiple commands, though I confess I haven't used this facility much yet, since my explorations were done with this review in mind.

The locations I have visited so far are well thought out and well described. The puzzles I have solved have been logical, and the ones I have not yet solved have provided the right measure of frustration.

One clue that I feel it right to offer is this: Some actions can only be performed after others have been correctly done. In other words, it is possible to try the right thing and fail because you need to do something else first.

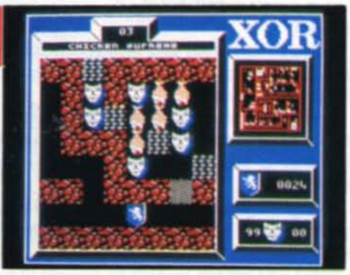
It isn't always because you are caught up in a chaining puzzle in the classic sense though – at least, not where cash and the bird man is concerned.

Winter Wonderland is a game I have no hesitation in recommending for newcomer and experienced adventurer alike. And beginners will be delighted to know that proper back-up help is on offer in the shape of a hint sheet.

Mad Hatter

Xor

★ ★ ★ ★ ★



XOR is a maze game that is played over a total of 15 levels with the option of beginning on any one, though I suggest you cut your teeth on level one.

The aim is to collect every mask that is held within the maze. The number of masks varies from maze to maze, but the total present and total collected are always displayed on the screen.

The maze walls are constructed of brick, and cannot be walked through. Some of the passageways are filled with two other types of material, known as dots and waves. Dots can only be passed through when travelling in a horizontal plane and waves in the vertical. In this way parts of the maze can be cordoned off until approached from the correct direction.

Price: £9.95 (cassette) £12.95 (disc). Supplier: Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ. Tel: 0223 323656

Maze number one should pose few problems, but the fun really begins on level two. The dots and waves are still there, but they have been joined by fish and chickens.

The fish act in a similar way to the boulders in Repton, falling vertically down when unsupported. The chickens are a different kettle of fish – they "fall" horizontally from right to left. A blow on the head from either of these characters is fatal.

Maze number four, entitled Explosive Mixture, sees the appearance of bombs and bottles of nitro glycerine. The starting point for this level is inside a completely-sealed cell of the maze. You soon learn that dropping fish or chickens on bombs causes them to explode, blowing a hole through the nearest wall.

One very clever feature of the game is the Replay facility which comes into operation when you've lost your second, and final, life – it retraces every move that you made on the current maze at high speed.

It can be used to determine at which point you made a wrong move, or you can use it to revel in the glorious way that your cunning overcame the game's puzzles.

The number and complexity of the puzzles is overwhelming and the fact that there is no time limit allows you to sit back and study the situation.

Carol Barrow

★★★★★ Excellent
★★★★ Worth buying
★★★ Only average
★★ Could do better
★ Give it a miss

The Superior Collection Volume 1

★ ★ ★ ★

SUPERIOR Software has recently released two compilations of golden oldies, and each collection of eight classics also contains a previously unreleased game.

The newcomer on Volume 1 goes by the name of Syncron, a fast-scrolling zap and blast game.

Hugging every contour of the planet's surface you weave your way through defence pylons, blasting missile silos, as you seek out the power orbs. Having collected an orb you make your way to the nearest runway to unload your cargo. Collect every orb, destroy the enemy HQ and you can move on to level two.

Syncron takes place over a background which scrolls vertically at a fearsome pace. You control the ship's left and right movement, or you can flip her over and travel in the opposite direction. Unfortunately what could have been an excellent shoot-'em-up is spoilt by the speed of the action – it's just too fast.

Star Striker is a version of the arcade game Moon Cresta, a zap-the-alien classic.

You are the pilot of a three-stage rocket, but you start the game flying the first stage only. After the fourth wave of aliens you are given the opportunity to dock with the second stage.

If you successfully complete this manoeuvre you earn a bonus and continue the mission with the added fire power of stage two of the rocket.

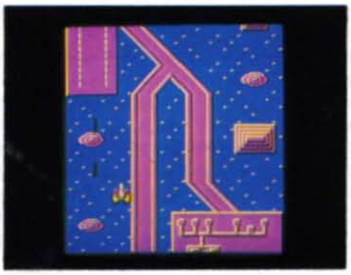
Each time you complete the nine waves of different aliens you begin again, but the bad guys are nastier each time.

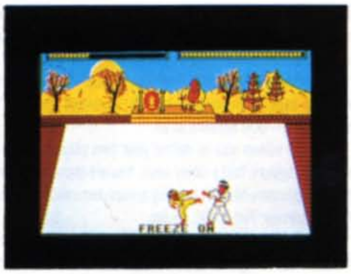
Star Striker is slower than the arcade original, but just as enjoyable.

In Airlift you fly over a planet's surface in your helicopter, rescuing people and transporting them back to the Red Cross hostel.

The people cannot be rescued until the enemy tanks, which prowl the surface, have shelled the houses in which the allied forces are hiding.

Price: £9.95 (cassette) £11.95 (disc). Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX. Tel: 0532 459453





As the game progresses you will be buzzed by auto gyros and killer satellites. Airlift, based on the arcade game Choplifter, is just as enjoyable as the day it was released.

'Ello, 'Ello, 'Ello . . . what's all this then? Smash and Grab is a ladders-and-levels game for the juvenile delinquent.

Money drifts out from a smashed bank window and down the screen. You control the dodgy-looking geezer with the swag bag who has to collect it before it reaches the river at the bottom of the screen.

But out to stop you is PC Plod. With truncheon in hand he will beat you senseless, throw you in the river, then read you your rights. Smash and Grab was hardly a mega game the first time round, but it's fun all the same.

Talking of mega games, Repton should need no introduction to any BBC Micro owner. Playing the green-skinned hero you have to search an underground maze and collect the diamonds hidden there.

The route you take must be carefully chosen – disturbed boulders may fall behind you, blocking your return along the same path.

Additional hazards are monsters which hatch from eggs, and a meagre time limit. Repton is an excellent mixture of dexterity and strategy.

Karate Combat is a game in which you attempt to beat the living daylights out of 16 different opponents, though most of the time it's the other way round.

A total of 16 moves is available to each player, all executed quickly and smoothly by the well-designed characters. Options allow you to practice against a punch bag, fight the computer's contestant, or challenge a friend in a two-player game.

In Wallaby, another game from the arcades, you play the role of Mrs Wallaby and slug it out with the evil monkeys who have kidnapped her baby.

The aim is to climb the ladders to the top of the screen, collecting fruit for bonus points, but avoiding the monkeys and the apple cores they throw.

The sprites aren't as cute as those in the arcade original, but the fun's still there.

The final game, BMX is the only second-rate program in the whole compilation. Ride your bike over the surface of the moon, shoot the aliens, blast the boulders and jump the craters. Boredom sets in within five minutes.

Despite this one duffer, Volume 1 of the Superior collection is excellent value for money.

Jon Revis

Footballer of the Year

★ ★

FOOTBALLER of the Year is a departure from Gremlin's normal visual masterpieces. It is a game of strategy and skill – not to mention a great deal of luck – for the football enthusiast.

The cassette cover shows some very nice pictures depicting footballing action, but states that these are from the Commodore 64 version.

Knowing the graphics capabilities of both machines I expected the graphics of the BBC version to be less detailed. This turned out to be an optimistic assumption – there weren't any.

You begin the game at the age of 17 with £5,000 in your pocket. This money can be used to buy any of three types of "card".

The first is the goal card. You begin the game with 10 such cards but can buy more if you wish. However, their price increases as you move up through the divisions.

A goal card can have a value of one, two or three, corresponding to the number of shots it represents.

The computer displays the fixtures and then asks whether you wish to play a goal card in any of the games.

If you play a card then you will be required to take the shots during the game, by indicating to the computer to shoot left or right. The computer then tells you whether you scored.

Transfer cards cost a small fortune but give you one opportunity of being spotted by a club scout.

If you're not what he's looking for you lose your money: If you're lucky you'll receive a transfer fee and an increase in salary.

Finally there are the incident cards, very much like the Chance cards in Monopoly.

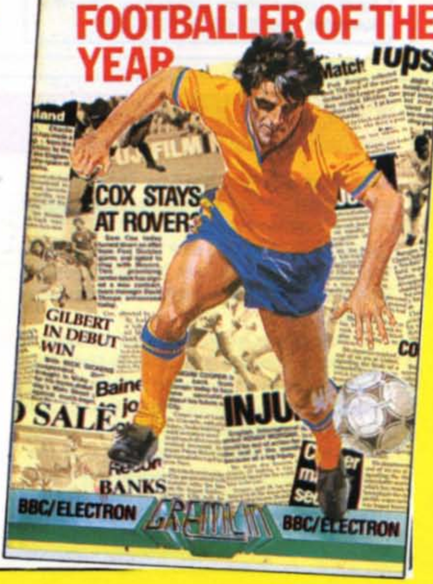
They occur at random throughout the game or you can buy one for £200. You may win some goal cards or you could be fined for bad behaviour – that's the chance you take.

The more goals you score, the more your rating as a player improves and the better the chance is of being spotted by a team from a higher division – if you can afford the transfer card.

Footballer of the Year is a game which requires very little thought and a lot of luck.

Steve Brook

Price: £9.95 (cassette) £14.95 (disc). Supplier: Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS. Tel: 0742 735423



Unbelievable Ultimate

★ ★ ★ ★ ★

THE latest release in the US Gold Master Game series is entitled Unbelievable Ultimate and consists of four of Ultimate's all-time greats.

The first offering is Jetpac, a tale of spaceship construction on a hostile planet. Not being a wealthy spaceman you cannot afford a ready-made ship so you order a kit from the Acme Interstellar Transport Company. This is obviously a bit of a cowboy outfit as each section of ship is delivered by being dropped from orbit.

The game follows your exploits as you don your jetpac and begin constructing the ship – in the middle of a meteor storm.

The title tune is excellent, the graphics large and colourful and the game is great fun to play.

Next in chronological order we have Sabre Wulf. Following a fall of unknown distance you find yourself trapped in a mystical jungle. A message etched deep in the rock reveals that your only chance of escape is to locate the four quarters of a sacred amulet.

With your trusty sabre in hand you scour every inch of the maze-like jungle in search of the amulet. As you might expect the jungle is teeming with wildlife – and most of it regards you as dinner.

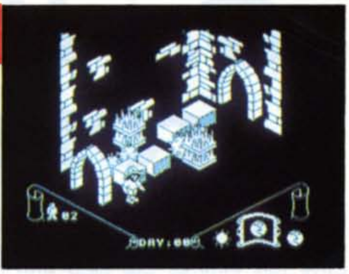
The best tactic when playing this game is to hold down the the fire key. This causes Sabre Man to rush through the undergrowth slashing at everything that moves – it may not be subtle but it is effective.

Sabre Man escaped from the jungle but only after he had suffered the curse of the wulf. Each day as the light fades he undergoes the dramatic transformation from man to wulf.

Somewhere deep within castle Knight Lore is the old wizard and only he can lift the curse. The game follows your journey through the deviously constructed castle rooms.

Knight Lore was the first game to employ Ultimate's famous, and much copied, 3D animation technique.

The final game is set in the village of Nightshade. Once a peaceful hamlet it was struck by a mysterious plague which transformed its inhabitants into hideous creatures.



Armed only with a pocket full of anti-bodies you venture into Nightshade in search of the evil Overlord who was responsible for the plague.

Nightshade is more zap-and-blast than Knight Lore and as such is a little easier to play.

This compilation reflects the high quality of all of Ultimate's games – well worth the money.

Carol Barrow

Price: £9.95 (cassette). Supplier: US Gold, Units 2/3, Holford Way, Holford, Birmingham B6 7AX. Tel: 021-356 3388.

The Superior Collection Volume 2

★ ★ ★ ★

THE Superior Collection Volume 2 consists of one new game plus seven oldies, five of which are arcade classics.

Kix is a version of Qix, a minor arcade hit. The playing area is a large square, known as the quadrant, in which you control the movement of a small cursor – the Kix – which leaves a trail as it moves.

Your aim is to use the trail to form an enclosed shape, which is then filled with colour. Once you have coloured 75 per cent of the quadrant you move on to level two – there are 20 levels in all.

Bouncing around the quadrant is a cloud of energy called a sparkler. If this touches your trail before you have completed a shape then you lose a life.

Additional problems are provided by tracers, small shapes similar to the Kix which crawl along your trail towards you. Kix is a superb conversion from the original – top marks.

In Deathstar you hurtle round the void of space, blasting asteroids with laser fire and causing them to emit energy crystals. You need these to make the starbombs which can destroy the huge Deathstar which the aliens are constructing. But the aliens will try and steal the crystals for their own devices.

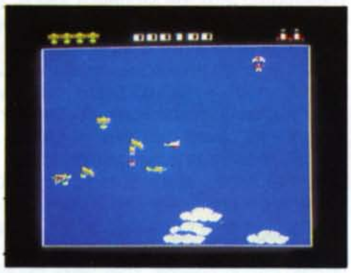
All you can do is blast everything in sight and have a great time – for soon the deathstar cometh!

Missile Strike is a great conversion of the classic game Missile Command.

Your task is to protect six neighbouring cities by shooting down enemy projectiles. Variety comes in the shape of aircraft, satellites, multi-warhead devices and intelligent homing missiles.

Repton 2 is the updated version of the original Repton. Unlike Repton, where each level was tackled individually, the 16 levels are all linked by transporters, effectively making them into one gigantic playing area.

This is a magnificent game of epic proportions that is riddled with monsters, spirits, safes and the inevitable devious puzzles.



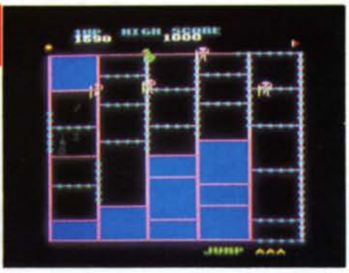
Moving back into the arcades we have Crazy Painter, a version of Amidar. Travelling on a large grid you attempt to "paint" around each square. As one is completed it is filled with colour, and if you manage to paint the whole grid you move on to level two, via a bonus screen.

On every screen you are pursued by nasty natives or terrible teddies, which hunt you relentlessly. Once again a competent conversion from the original.

Space Pilot has always been an arcade favourite of mine and Superior's version is a stunner.

Soaring round the skies in your high-powered jet fighter you blast First World War biplanes to smithereens – oh the joy of unlimited fire power!

The next waves consist of Spitfires, helicopter gunships, jet fighters, and finally UFOs. Watch out for the homing missiles that are launched from the modern aircraft. Superb graphics and fast action make Space Pilot a winner.



Yet another arcade conversion is Battle Tank, modelled on Battlezone. Sitting at the controls of your tank you locate your next victim on the radar scanner. Swinging the machine around you race towards the enemy, your target comes within range, you loose a shell – kaboom!, exit one enemy tank.

Unfortunately Battle tank isn't quite as fast as the original and the graphics are nowhere near as good – but you forget these quibbles when you're running for your life.

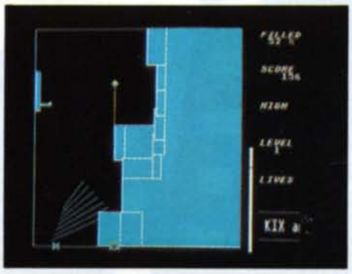
The final offering in Volume 2 is Overdrive, a motor racing game of sorts.

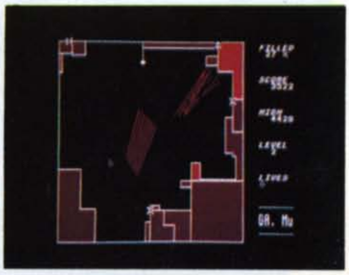
This is the only disappointing game of the compilation. You drive along a straight road as fast as possible, trying to avoid the cars that appear in front of you. I soon found it very boring.

At just £1 for each game the Superior Collection Volume 2 is a must for anyone wanting a collection of arcade greats.

Nev Astly

Price: £9.95 (cassette) £11.95 (disc). Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX. Tel: 0532 459453





On-the-spot coverage

Martin Cooper finds micros hard at work at the BBC

PORTABLE micros seem to be quite the thing these days, especially now that Sir Clive has entered the field with his battery-powered Z88.

In journalistic circles, lapheld LCD screen machines are becoming commonplace. Pressrooms used to echo with the voices of reporters yelling down the phone. Now they are filled with the tack-a-tack of keyboards as correspondents bash out their copy on Tandys.

Rather surprising then, that the BBC Micro is also an increasingly common sight – complete with full-sized monitor, disc drives, modem and a tangle of wires.

The journalist at the keyboard is likely to be a sub-editor from Ceefax.

BBC Micros are the key to the on-the-spot coverage that Ceefax is providing from more and more events. They have been used to report on the British Open from Turnberry in Scotland, on the RAC Rally from Bath and on the Embassy World Snooker Championships from the Crucible in Sheffield.

At the Commonwealth Games in Edinburgh and at Wimbledon three or four BBC Micros were in constant use.

The journalists covering these events are not just sending material back to the newsroom. They are using the micros as editing terminals linked to the main Ceefax computer at Television Centre in London and broadcasting pages "live" to 14 million viewers all over the country.

Duty editor Graham Norwood recently returned from Dublin, where he was covering that well-known sporting event, the Irish general election.

"There's no doubt that we're the envy of other journalists on these occasions", he says. "We can broadcast our pages so easily – without masses of equipment and large camera crews, or interminable phone calls back to the office . . ."

Mode 7 is what makes all this possible. When Acorn's Proton was transmuted into the Models A and B, the BBC specified that a teletext display option should be built in.

This was done with an eye to future developments in telesoftware, but it was not long before someone realised that the micros could be used to create as well as receive teletext pages.

At the time, state-of-the-art editing terminals were bulky and expensive. In most cases they consisted of a purpose-built keyboard and a cabinet full of printed circuit boards. They were troublesome to transport and set up and cost so much that sending two terminals to an outside event (one as backup) seriously reduced the equipment available in the main newsroom.

The BBC Micro, on the other hand, was comparatively cheap, easily ferried around in the boot of a car and capable of reproducing all the requirements of broadcast teletext – including a couple of control characters not documented in the User Guide.

Codes 138 and 139, listed as "nothing", actually punch "boxes" in the TV picture to allow subtitles to show through – not a lot of use to most micro users.

A BBC engineer wrote a rom-based terminal package which he called MicroFax. From then on, with a small pool of BBC Bs, Ceefax was on the road.

Communication between a BBC Micro and the main Ceefax computer (a DEC PDP11) is via the RS423 port, at 9600 baud if the micro is in the newsroom – where a modem is not needed – otherwise at 1200 baud.

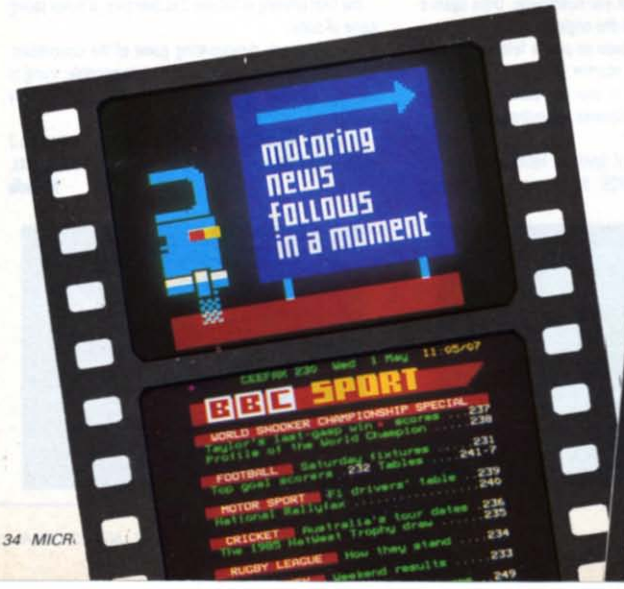
Ceefax, like the rest of the BBC, uses specially-leased four-wire British Telecom circuits to carry data around the country, rather than the public telephone network. These have the advantages of being noise-free and off limits to the general public, well-meaning or otherwise.

For added security, a system of passwords defines exactly which areas of the output each micro can access.

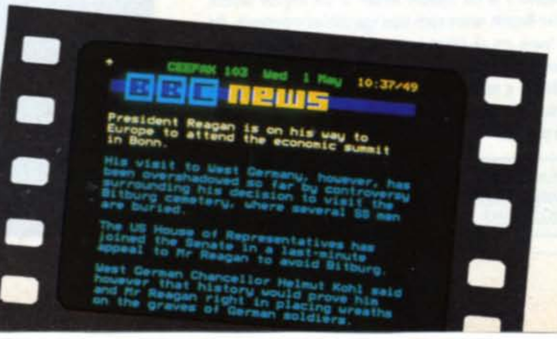
Working offline with MicroFax, a sub-editor can store up to 20 pages in memory and save the whole 20k "magazine" on disc. Pages can be edited or erased, merged or dumped to a printer. Online, pages stored in memory or on disc can be uploaded in bulk to Ceefax, and as many of the main system's facilities can be used as password privileges allow.

MicroFax is modelled on the Aston terminals that make up most of the newsroom's equipment. The 24 lines of the page being edited fill most of the display, but a one-line window at the bottom of the screen allows commands to be sent either to the micro or to the Ceefax computer.

Text is entered in a way that will be



CEEFAX 230 Wed 1 May 11:05/07
BBC SPORT
WORLD SNOOKER CHAMPIONSHIP SPECIAL
Taylor's last-gasp win - scores ...237
Profile of the World Champion 238
FOOTBALL Saturday fixtures 231
Top goal scorers 232 Tables 241-7
MOTOR SPORT F1 drivers' table 239
National Rallyfax 240
CRICKET Australia's tour dates ..236
The 1985 NatWest Trophy draw 235
RUGBY LEAGUE How they stand 234
Weekend results 233
249



CEEFAX 102 Wed 1 May 10:37/49
BBC news
President Reagan is on his way to Europe to attend the economic summit in Bonn.

His visit to West Germany, however, has been overshadowed so far by controversy surrounding his decision to visit the Bitburg cemetery, where several SS men are buried.

The US House of Representatives has joined the Senate in a last-minute appeal to Mr Reagan to avoid Bitburg.

West German Chancellor Helmut Kohl said however that history would prove him and Mr Reagan right in placing wreaths on the graves of German soldiers.

familiar to anyone who has used a word processor – except, of course, that there is no scrolling.

The operator can insert and delete, or move lines up and down the screen, but the size of the page is so limited – about 80 words – that elaborate text-handling facilities are not really needed.

Graphics are more complicated. Dabblers in Mode 7 will know that each of the chunky teletext graphic characters corresponds to a letter on the keyboard.

The factor which decides whether an alphanumeric (letter) or graphic character will be displayed is the control code preceding it. On a teletext page these appear as blank spaces, but they are entered from the keyboard just like any other characters.

Using MicroFax, the function keys in conjunction with Shift and Control supply alphanumeric or graphic colour codes. Other codes, like flash and double height, are obtained with combinations of Control and the letter keys.

With control codes in place, MicroFax allows six keys (QWASZX) to be used as a "graphics patch". Each switches on or off one of six segments to define the Mode 7 graphics character required.

"Outside broadcasts" were not the only innovation made possible by the BBC Micro. There are several BBC Bs in the Ceefax newsroom, where they serve as extra terminals, but other BBC departments also have their own machines which they use to contribute pages. Some send discs to be checked and uploaded by Ceefax sub-editors, others go online to the main computer.

"It saves us a lot of routine inputting", says Graham Norwood. "The BBC stand at the Ideal Home Exhibition might have its own micro and modem, for example.

"We would give them a password which allowed access to just one page, and they could update details of the exhibition for themselves. Otherwise the information would probably come to us on paper and someone here would have to type it in".

Several specialist pages are produced either by Ceefax staff or by outside contributors working at home on their own micros. The pop music page Ceetrax and the weekly computer "column" Next both arrive on disc every week as MicroFax files.

Next regularly includes items written on other micros, most commonly Spectrums and Commodores. These are sent to the editor via Prestel mailbox, and since Prestel shares the teletext format they can be downloaded straight into a BBC Micro to have colour and graphics added before being broadcast.

With so many micros around the Ceefax newsroom, it was inevitable that someone would start programming on them.

Pages containing football fixture lists and league tables are compiled and broadcast automatically every Saturday during the season. The software, written in Basic by one of the sub-editors, calls results pages from the main computer, reads the scores from them and updates the league tables accordingly.

The whole job, which used to require half an hour of painstaking checking, is finished in a couple of minutes.

Not all programming efforts are this successful, however. During the last local elections one of the team came up with a short machine code routine to count the gains and losses suffered by each party.

The program was supposed to call up each of the results pages in turn and check for changes. Halfway through the night it announced its political inclinations by refusing to acknowledge any more Conservative gains. The count was continued manually.

Ceefax Editor Graham Clayton has a BBC Micro running in his office, though it is not linked to the main computer. He uses a teletext adapter to keep an eye on the output from the viewers' end. The adapter detects any updates on the channel it is tuned to and captures the new pages for him to check through.

"With about 300 pages on BBC1 alone it would take me a couple of hours to read them all", he explains, "and by that time most of them would have been updated again anyway. This is really the only way I can keep track of all the changes".

Another piece of software he uses with the adapter can carry out a keyword search of all the pages being broadcast on the selected channel. The search takes a single cycle of the Ceefax magazine – currently about 15 seconds – and pages containing the keyword are stored for immediate display.

It is not foolproof, however. A page on the latest Test match will have a large graphics heading saying "Cricket", which will go undetected. The text itself may well not contain the keyword.

One of the most successful examples of an Acorn machine handling Ceefax pages cannot be seen in this country.

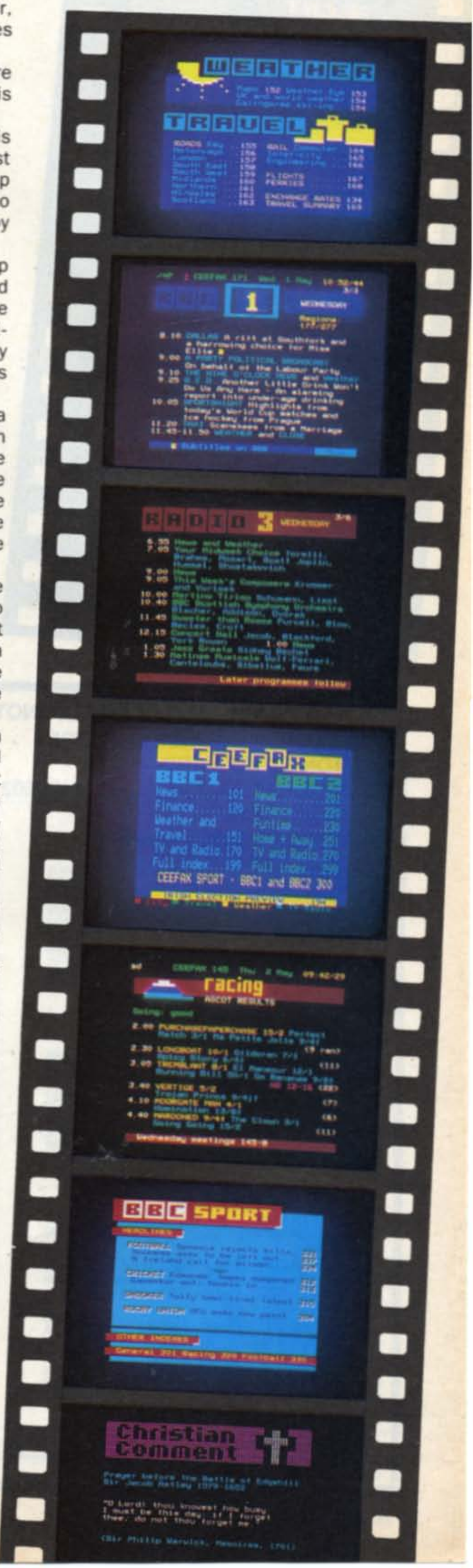
In March this year a new service was launched on the French videotex system Teletel. It consists entirely of pages taken from Ceefax, updated several times a day.

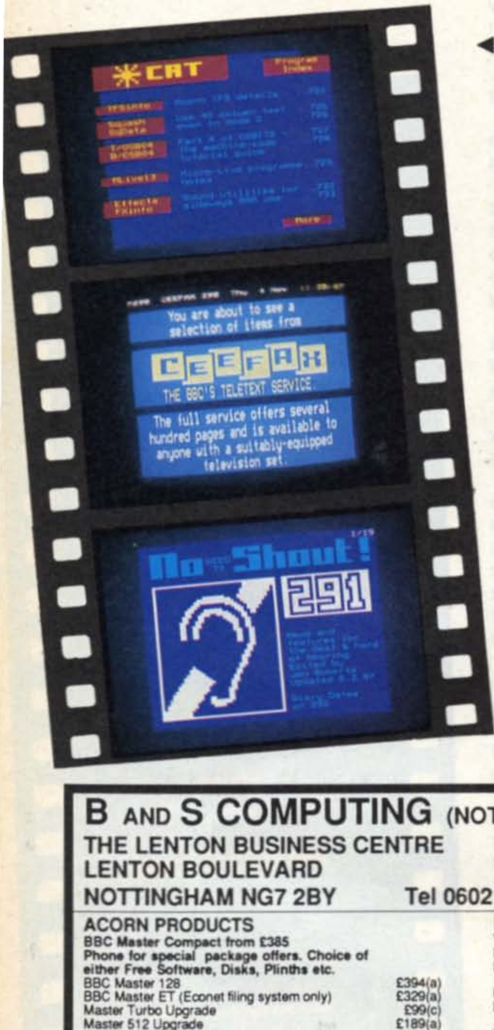
Teletel is page-based like Prestel and Ceefax, but inevitably the two standards are incompatible. Nevertheless, the transmission of pages is fully automated and handled from beginning to end by a Master 128.

The software for selecting pages and translating them into the French standard was written by Graham Bartram, already well-known in teletext circles as author of the ATS rom.

At set intervals during the day the

Turn to Page 36 ▶





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◄ *From Page 35*

Master logs on to the main Ceefax computer and calls up a selection of pages, saving them on disc. On each one English trail lines referring to Ceefax page numbers are replaced by French prompts.

Periodically there is a call from France, received via an "intelligent" auto-answer modem, and the Master reads each of its stored pages over to a Paris-based PC, translating the characters into their Teletel equivalents as it does so. It also sends instructions with each page telling the French host computer where it should be stored in the Teletel database.

The process is entirely transparent as far as the rest of Ceefax is concerned. The main computer regards the Master simply as a terminal, displaying pages like any other.

The BBC Micro has two disadvantages when compared with purpose-built teletext editing terminals. The keyboard is rather restricted, especially when it comes to graphics, and it is unable to display the control characters which produce text colours and other effects.

The second of these two problems is probably insurmountable (though we have all heard that one before). Most purpose-built teletext terminals can toggle on and off a set of symbols indicating the position of control characters.

It is difficult to see how this could be done on a micro, short of some Elite-style juggling of modes which would greatly reduce the memory available for offline page storage.

The keyboard problem is more easily dealt with. Ceefax and Softel, a company specialising in teletext equipment, have been experimenting with new casings for the BBC Micro.

The main board and two disc drives are housed in a single console, PC-style, while a remote keyboard has been laid out with MicroFax in mind.

The 10 function keys have been replaced by a row of 23 covering all the control codes. The "graphics patch", meanwhile, has been given its own block of keys, rather like the Master's numeric keypad.

The design is still undergoing trials, but it is possible that before long the BBC Micro – minus the familiar beige box – may become standard equipment in teletext newsrooms.

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Save programs, save pounds

Gordon Horsington weights the pros and cons of using teletext adapters

REGULAR readers will have seen the special offer for Acorn Teletext adapters in recent editions of *The Micro User* and hopefully many will have taken advantage of the very competitive price and bought one.

If you are one of the three million or so people in Britain who already have access to teletext with your TV set you may have asked yourself if it was worth buying the adapter just to have teletext on your monitor as well as on your TV.

The answer is yes. The adapter will give you access to the telesoftware service that ordinary TV teletext viewers can look at but never use.

Those using MicroLink, Prestel and bulletin boards will already know about telesoftware, and may well have used their modems to download some of the many files available on these services.

The telesoftware service available via the telephone network has the disadvantage that even the free software has hidden costs such as telephone connection charges and the software has to be indirectly paid for.

For example, *The Micro User* monthly listings can be downloaded from MicroLink for just the connection charge, but if you want to download all the listings it can cost almost as much as buying the listings cassette.

The telesoftware available from BBC Ceefax has the advantage of costing you absolutely nothing as long as you have a TV licence and a good outdoor TV aerial. And the quality of software provided by the BBC is always of the very highest professional standard.

Of course telesoftware is not the answer to everyone's software shortage problems, and will not in its present form replace the computer dealer's software shelf.

You are unlikely to be able to download Elite or Thrust, but you will be able to choose some very good games, utilities, teletext interactive software, tutorials, teaching and educational programme notes.

If you have bought an Acorn adapter, connecting it to your computer is quite easy. Following the clear instructions in the User Guide, you must switch off all the hardware, connect the 34-way IDC socket on the adapter lead to the 1 MHz bus, fit either the Teletext Filing System rom (TFS) or the Advanced Teletext System rom (ATS) into an empty rom socket on the computer board, plug the adapter into the mains, and switch everything on.

Surprisingly the 1 MHz bus connection on the Acorn adapter doesn't conform to Acorn's own standard for 1 MHz bus connections.

Acorn has specified that a 34-way output header plug connector should be provided so that the 1 MHz bus connections can "feed through" the unit so that more devices, such as Winchester discs or music synthesisers, can be connected. The output header is not fitted to the Acorn adapter.

The first job the novice teletext user has to do is to tune in the adapter. Although it only needs to be tuned once, this can take ages with the Acorn system and can lead you to believe that a perfectly good adapter does not work.

Read the Teletext User Guide carefully and take particular note of the instruction to turn the tuning controls very slowly. Anything other than very, very slowly can lead to the use of strong language and little else. Having mastered the tuning controls, the time will eventually come when you can start to use the adapter.

The ease of using any hardware depends entirely on the quality of the software used to control it. This is true for the teletext adapter, and the ATS software is much easier to use than the TFS.

When you use the ATS to download telesoftware on a BBC Micro with OS 1.20 you should type *FX5 to disable the printer before accessing teletext. This is because the MOS (not the ATS) has a bug that can cause the computer to hang up when the telesoftware catalogue is displayed.

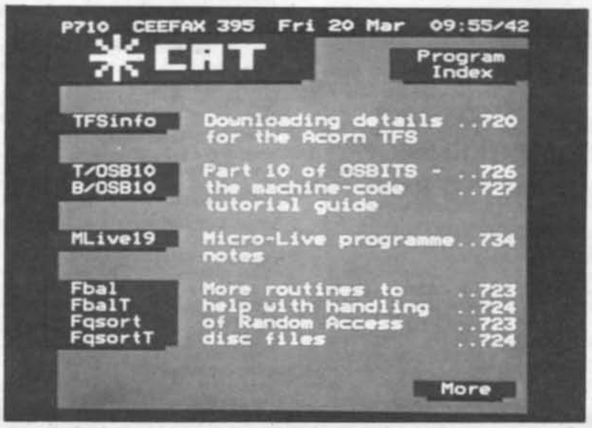
Back in the bad old days before the ATS became available, downloading software with the TFS was not a particularly enjoyable experience. It was necessary to load a software patch from disc for every file and keep notes of load and execute addresses and file sizes taken from the teletext pages.

Things have improved a little for the TFS user, but the new ATS has done away with all the old TFS drudgery.

When you are ready to download software, make sure the function key strip is available and type *TELETEXT and press Return. That is the only command you need to remember unless you write your own teletext interactive software.

Your computer will enter the teletext terminal mode and allow you to use the Micro as an ordinary teletext receiver.

Most adapter facilities are controlled with the red function keys. To download software with the ATS first select BBC2 by pressing Shift+f2, then press f5 and wait for the catalogue to download.



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P710  CEEFAX 395  Fri 20 Mar  09:55/42
  CAT                        Program
                              Index

TFSinfo    Downloading details ..720
           for the Acorn TFS

T/OSB10    Part 10 of OSBITS - ..726
B/OSB10    the machine-code    ..727
           tutorial guide

MLive19    Micro-Live programme..734
           notes

Fbal       More routines to    ..723
FbalT      help with handling  ..724
Fqsort     of Random Access    ..723
FqsortT    disc files          ..724

                                More
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Turn to Page 38 ▶

Page 37

it is displayed select the file you with the cursor keys and press 1.

software will download and iatically save to disc. It is really so e that anyone who can read the gue can download software.

tware comes from a number of es, including some – but not all – listings printed in *The Micro User*. ping in the listing of the game a from the February 1986 edition e *Micro User* must have been a mare for any intrepid key basher could add new problems with every yped command.

lesoftware users could download and many other *Micro User* pro- s free of charge in less than the it takes to post a cheque for the thly listings disk.

eletext interactive software has n, and will continue to be, broadcast ne BBC. All the information you need rite your own interactive software is uded in the Teletext User Guide.

his type of software, as its name sug- ts, can interact with the information ilable on teletext pages. You can write or use software to manage your shares using the Stock Exchange pages from teletext, or predict the football results using teletext football information or print out any teletext page.

Software to perform these and many other interactive tasks has been broadcast, and tutorials on writing the software are due to be transmitted during 1987.

The ATS will also give you access to the new fastext system which stores pages in memory for "instant" display. In fact teletext on the BBC Micro is even more versatile than fastext because it can be controlled with interactive software using, for example, keywords to search the teletext pages.

Channel 4 is starting to set up a telesoftware service. It is still in its infancy and, at the time of writing, it is of marginal interest to BBC users.

The only BBC Micro program broadcast to date on Channel 4 has been a test program which failed to download giving endless "bad data" messages in the process.

Channel 4 does not yet support the BBC catalogue standard, and you need to write your own interactive software to attempt to download it with the ATS. This is not difficult for an experienced programmer, but it is not yet a very rewarding exercise.

In the future Channel 4 may adopt the same high standards set by the BBC telesoftware service. If it does, owning or having access to a teletext adapter will be a must for every BBC Micro user.

Predicting the future is very difficult, and we may yet see the equivalent of closed user groups within the telesoftware service. Legislation has already allowed broadcasters to charge for the teletext service they provide, and this may well result in extra licence fees or special rented decoders for telesoftware users.

At the moment and for the foreseeable future, the BBC provides a first class, free telesoftware service to all TV licence holders. If you want to expand your software library without spending your hard earned money every week, or if you want teletext or fastext without buying a new television set, then the teletext adapter with the ATS is certainly worth owning.

The Micro User offer for the adapter represents exceptionally good value for money. With the ATS you have one of the best hardware bargains of the year. ■

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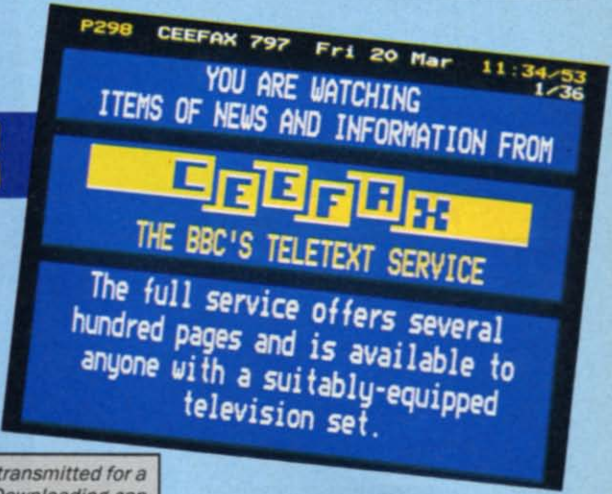

P298 CEEFAX 797 Fri 20 Mar 11:34/53
1/36

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May 1 to 7

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SD	A single-density Mode 7 screen-to-printer dump. Choose between white or black background. (Epson MX80 compatible).
DD	A slower, but clearer, double-density Mode 7 printer dump.
T/OSB16	Part 16 of our BBC assembler and machine code guide. This course leads you through the workings of the inbuilt BBC Micro 6502 assembler in a series of around 26 parts.
T/ATS05	Programming using the ATS rom. Part 5 of our series explaining the techniques of producing Ceefax-interactive Basic programs. This module examines the teletext page-linking system, and provides routines to interpret the link settings on any teletext page.
MapDat **Fall** **Rome**	Control the Roman Empire! In this game you must maintain the Empire by controlling your troops.
Learner	Add power and flexibility to your word processor by teaching it special key sequences. (*The Micro User*, September 1986).

Software is currently transmitted for a period of one week. Downloading can take place from Friday evening to the following Thursday evening. As the updating takes place on a Friday, we do not advise attempting to download software between 9am and 7pm on Fridays. The program details given are provisional.

May 8 to 14

Program	***Description***
AutoLoad	An automatic program downloader (using ATS). Select which files you would like to download. The system will capture and save your chosen files without further intervention.
NLQprnt **NLQinfo** **NLQchrs**	Earlier Epson printers do not include an NLQ (Near Letter Quality) font. This suite of programs provides an NLQ facility on the Epson MX range and on other printers with a dot-addressable printing mode.
T/OSB17 **B/OSB17**	Osbit's machine code programming series, part 17.
Domino2	Play dominoes against your computer.
Colours	A complete learning package based on the effect of colour subtraction.

May 15 to 21

Program	***Description***
MCWL	This provides the means to compare quotations from various companies for minimum cost whole life insurance. The estimated long term results are displayed on screen in graphic form.
T/OSB18 **B/OSB18**	Osbit's machine-code programming series, part 18.
T/ATS06	Interactive programming guide, part 6. This module shows you how to download software without using the broadcast catalogue information.
VidiEd	The ultimate Mode7 teletext screencreator/editor. This is the same software as used by the BBC to prepare their entire Ceefax magazine. Several support packages will be available for the VidiEd software in the future.
GRead	A series of procedures and functions to add to your own Basic programs, helping with the handling of disc-based random access files.
DisASS1 **DisAss7**	With these programs you will be able to handle all 6502 and CMOS 6502 instructions. (*The Micro User*, January 1987).

Turn to Page 40 ▶

NEXT and EDITORIAL FEATURES DURING MAY

Miles Potwell will try his hand at on-line banking. Does it actually save money?

In Paper Round, Keith Hazelton will browse through the computer press – commercial and amateur – and offer advice to hopeful fanzine editors.

Richard Hewison will do his best to extricate a few viewers from tight corners in Adventure SOS, and look at Professional Adventure Writer, the latest utility from Gilsoft.

Outsider, the Ceefax mole in Prestel, will get the lowdown on the promised keyword search facility, and index by any other name . . .?

Plus news for the micro world, answers to viewers' computing problems, and reviews of the latest software.

Next news and features are on BBC2 701, reviews on BBC2 702. Both are updated every Saturday.

May sees a batch of Ceefax specials on its editorial pages – two outside broadcasts plus an election. The climax of the Embassy World Snooker Championship will come live to teletext viewers from The Crucible in Sheffield, with the final taking place on May 4.

Less than a week later the London Marathon will also be serviced by live Ceefax updating from the event's base.

Both OBs will involve BBC Micros based at competition headquarters with Ceefax journalists providing scores and placings before any other medium.

And on May 7 the Ceefax election team will bring teletext viewers a complete guide to the results as they come in from the local elections throughout England and Wales.

A special through-the-night magazine will bring the state of the parties, gains and losses, individual council compositions and reactions from top politicians.

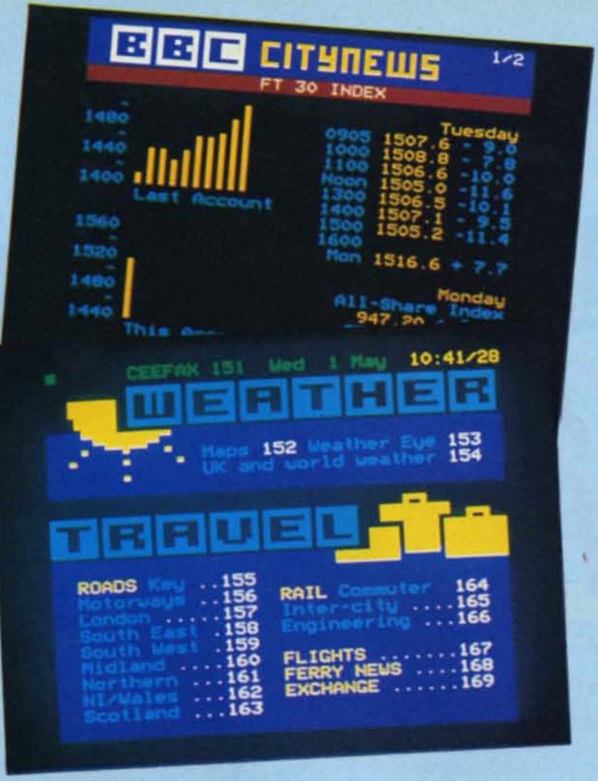
◀ *From Page 39*

May 22 to 28

Program	*Description*
T/OSB19 **B/OSB19**	Osbit's machine code programming series, part 19
DRV/SRC **DRV/OBJ**	A View printer driver utility providing features such as underlining for the early Epson MX80s which do not have this feature as standard.
FAdd **FDel** **FSrch**	More routines for dealing with disc-based random-access files
Folio	A financial Ceefax-interactive program which allows you to build a portfolio of shares, either real or imaginary, and keeps a track of your investments by frequent access to the Ceefax City pages. It will find the actual value of shares, offering the opportunity to buy or sell any of the 160 or so equities listed. Arranged in the form of a game, it also offers valuable facilities for the serious investor.
Select **SelInfo**	Sideways ram software allowing simple selection of the required version of Basic. Some of the extra commands available include: *HIBASIC (to activate the 6502 second-processor version), *LOBASIC (to select BASIC2), and *OLDBASIC (to select BASIC1 if present).
Tables	Learning can be fun with this short but effective multiplication tables tester. (*The Micro User*, December 1986)

May 29 to June 4

Program	*Description*
T/OSB20 **B/OSB20**	Osbit's machine code programming course, part 20.
T/ATS07 **B/ATS07**	Interactive programming guide, part 7. This module looks at sub-page numbering procedures, and how to determine the sub-page reference of the captured page.
FPrint **FBal** **Fqsort**	Further procedures assisting with disc-based random access files.
Accounts	A program to help with the financial organisation of clubs and societies. Originally written for use with church accounts, it could be modified to suit most purposes.
Sun	By selecting any part of the world, the time of sunrise and sunset in the region can be calculated for any day throughout 1987.
Viewpre	A versatile screen drive for View which lets you preview a whole page at a time, complete with highlights. (*The Micro User*, September 1986).



BBC CITYNEWS 1/2
FT 30 INDEX

Tuesday
0905 1507.6 - 9.0
1000 1508.8 - 7.8
1100 1506.6 -10.0
Noon 1505.0 -11.6
1300 1506.5 -10.1
1400 1507.1 - 9.5
1500 1505.2 -11.4
1600
Mon 1516.6 + 7.7

Monday
All-Share Index
947.20

CEEFAX 151 Wed 1 May 10:41/28
WEATHER
Maps 152 Weather Eye 153
UK and world weather 154

TRAVEL
ROADS Key ..155
Motorways ..156
London 157
South East .158
South West .159
Midland 160
Northern ...161
NI/Wales ...162
Scotland ...163

RAIL Commuter 164
Inter-city 165
Engineering ...166

FLIGHTS 167
FERRY NEWS 168
EXCHANGE 169

INDEX

SUBJECT	BBC 1	BBC 2
Addresses	189	289
AIDS information	—	295
Air travel	167	—
Alarm clock	196	296
Armchair guide	194	—
BBC Facts	140	—
BBC programmes	170	270
BBC programmes – top 10	—	265-6
Bids and deals	123	—
CEETRAX – pop column	—	249
Chess	—	267-9
Christian comment	—	294
Consumer news	—	252-9
Commodities	136	—
Company results	137	—
Computer programs	—	700
Computer page – Next	—	701-2
Deaf people's column	—	291-2
Educational programmes	176	276
Educational support	187	287
Family finance index	—	220
Farm prices	192	—
Ferries	168	—
Films: In the 2 an' 9s	—	264
Films on television	175	275
Films on TV this week	185	285
Finance headlines	120	—
Fish prices	—	258
Flights	167	—
Food prices	—	257-9
Foreign exchanges	135	—
Fruit prices	—	259
FT indices	125	—
Fun index	—	230
Gardening	—	260
Gold prices	136	—
Home and Away index	—	251
In the 2 an' 9s - Films	—	264
Interest rates	135	—
ITV London	173	273
Jokes – see	—	230
Metal prices	136	—
Moneyfile index	—	220
Motoring	—	263
Motorway delays	156	—
Natural history	—	262
News headlines	101	201
News index	102	202
Newsflash	150	150
Newsreel	119	219
Next: The Micro Page	—	701-2
No Need To Shout	—	291-2
Pop column	—	249
Pop record charts	—	247-8
Programme news – see	140	—
Puzzles – see	—	230
Rail news – see	151	—
Recipe	191	—
Road reports – see	151	—
S4C evening programmes	173	273
Share prices	130	—
Shopping basket	—	257
Scottish ski reports	154	—
Sport	300	300
Stock markets	127	—
Subtitles	888	888
Telecred	—	240
Telesoftware index	—	700
Television index	170	270
Test page	197	—
Train cancellations	151	—
Transmitter information	195	—
Travel news index	151	—
TV Choice	177	277
TV Tomorrow	178	278
TV Day-after-tomorrow	179	279
Vegetable prices	—	259
Weather Eye forecast	153	—
Weather in the resorts	154	—
Weather maps	152	—
Weather/travel index	151	—
Wildlife	—	262
World weather	154	—

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Interactive teletext techniques

Tony Rudkin offers some Basic routines to give accessing Ceefax that personal touch

READERS who took advantage of *The Micro User's* special offer and bought the teletext system will be well aware of the tremendous amount of free information transmitted by the four TV stations.

The simple use of the *TELETEXT command converts the computer into a teletext terminal allowing pages from any channel to be viewed and stored, giving easy access to information on TV programmes, travel, weather, news and so on.

Although it is simple to view the teletext pages, it is less easy to extract information from them. The data format used is quite complex, with a 40 character line of text being transmitted as 42 eight bit bytes.

The first two bytes contain information which does not appear on the screen. The remaining 40 bytes are in a form which is suitable for direct display only when interpreted by the teletext video circuit in a BBC B or Master.

With care this same data can be converted into a form which can be used in Basic programs. There it can do such potentially useful things as keeping a record of share prices, listing currency exchange rates and providing a real-time clock for the computer.

You can even automatically store data for later use in applications such as your own carousel-type show.

Most people who have bought the teletext system recently will also have bought the Advanced Teletext System (ATS) rom. This allows much simpler access to the free software transmitted by BBC2 and provides more powerful facilities when used in Basic programs than the standard teletext rom.

Serious teletext users are recommended to upgrade to the ATS rom at the earliest possible opportunity. This is especially applicable to computers which are not fitted with shadow memory, as the standard teletext rom consumes over 5k of the memory compared with a mere 256 bytes for the ATS one.

For the purposes of this article either rom may be used, and where there are different commands both are indicated in the program listings.

The techniques described have been chosen for their simplicity so you can experiment with the teletext facilities.

```
   10 REM Sample Teletext P
rogram
   20 REM For Advanced Tele
text System rom
   30 REM (C) Micro User
   40 REM For standard Tele
text ROM replace
   50 REM *TTXON in line 90
 with *TELESOFT
   60 REM and *TTXOFF in li
ne 140 with *ADFS, *DISC or
 *TAPE
   70 :
   80 MODE 7
   90 *TTXON
  100 *BBC1
  110 *PAGE 171
  120 *TRANSFER 6000
  130 *DISPLAY 6000
  140 *TTXOFF
```

Program I: Reading a teletext page

The teletext roms have limited facilities for operation within Basic programs, and a typical example is given in Program I. This simply selects the teletext mode, the TV channel to be accessed and the page number of interest.

Then a sequence of commands transfers data from this page to the computer memory (starting at address &6000), displays the page on the screen and finally disables the teletext rom.

In many ways this process emulates the terminal mode offered by the teletext rom. But since it is written in Basic it allows much more flexibility, and can easily automate the capture and display of regularly-accessed pages.

It is worth noting that the *PAGE command which selects the page of interest can be extended further to specify which sub-page within the chosen page is accessed. For example, *PAGE 1300002 would select sub-page 2 of page 130.

Having captured a teletext page in memory, further work is required to make the information useful. This simply means that the special teletext control codes need to be removed and the data converted to printable Ascii characters.

This is done by a Basic procedure (PROCConvert) which examines each active data byte and takes action depending on its value. If the byte value is greater than 128 it is reduced by 128 and if less than 32 the byte is replaced with a space character (32).

The procedure, shown in Program IIa and IIb, requires the start value of the memory area to be transferred, and is called with a Basic line such as:

```
60 PROCConvert(&6000)
```

to indicate that the page data to be converted is located in the memory from address &6000 onwards.

The address value passed in the procedure call must agree with the address value which follows the *TRANSFER command.

The procedure takes a few seconds to complete the conversion and creates an area of memory containing information which can easily be transferred into a Basic program using the second procedure given in Program II.

This Basic procedure identifies the start of the required row of text and then transfers the text on that line to a Basic string variable called *Text$*.

The required row number is passed to the procedure with the start address by enclosing the address value and row number in brackets after the procedure

```
 1000 DEF PROCConvert(Addre
ss%)
 1010 FOR Row%=0 TO 23
 1020 FOR Column%=0 TO 39
 1030 Pointer%=Address%+Row
%*40+Column%
 1040 Byte%=?Pointer%
 1050 Byte%=Byte%AND&7F
 1060 IF Byte%<32 THEN Byte
%=32
 1070 ?Pointer%=Byte%
 1080 NEXT Column%
 1090 NEXT Row%
 1100 ENDPROC
 1110 :
 2000 DEF PROCGetText(Addre
ss%,Row%)
 2010 Text$=""
 2020 IF Row%>23 OR Row%<0
THEN ENDPROC
 2030 Pointer%=Address%+Row
%*40
 2040 Pointer%?40=13
 2050 Text$=$(Pointer%+1)
 2060 ENDPROC
```

Program IIa: Converting text, TFS rom

name. So a program sequence of the form:

```
70 PROCGetText(&6000,6)
80 PRINT Text$
```

would search from address &6000 for row 6 and extract the text information ready for it to be printed to the screen in line 80.

For the ATS rom the procedure PROCGettext simplifies its search for row numbers by looking only at those memory locations that actually contain row number information.

These locations occur every 42 bytes and once a match is found the 40 characters of text can be extracted.

It should be noted that the teletext signal convention does not require all rows of text to be transmitted and any row which is not found is assumed to be blank.

For the standard teletext rom the data is stored without the additional two bytes and the position of the start of the line of text is calculated directly from the row number.

When using PROCGettext you should remember that the 24 teletext rows are numbered from 0 to 23, and any attempt to request text from rows outside this range will also result in a blank line being returned.

Having now created a simple method of extracting text information from teletext data we are in a position to use these techniques in a practical way.

A typical example might be the extraction of a news item transmitted on BBC1 Ceefax page 102.

If we ignore the header information appearing at the top of the page, the real text is contained in rows 5 to 23. This can be extracted and sent to a printer with a very simple program of the form shown in Program III.

```
 1000 DEF PROCConvert(Addre
ss%)
 1010 FOR Row%=0 TO 23
 1020 FOR Column%=2 TO 41
 1030 Pointer%=Address%+Row
%*42+Column%
 1040 Byte%=?Pointer%
 1050 IF Byte%>=128 THEN By
te%=Byte%-128
 1060 IF Byte%<32 THEN Byte
%=32
 1070 ?Pointer%=Byte%
 1080 NEXT Column%
 1090 NEXT Row%
 1100 ENDPROC
 1110 :
 2000 DEF PROCGetText(Addre
ss%,Row%)
 2010 Text$="":I%=0
 2020 REPEAT
 2030 Pointer%=Address%+1+I
%*42
 2040 I%=I%+1
 2050 UNTIL ?Pointer%=Row%
OR I%=24
 2060 IF I%<24 Pointer%?41=
13:Text$=$(Pointer%+2)
 2070 ENDPROC
```

Program IIb: Converting text, TFS rom

```
   10 REM Sample Teletext P
rogram
   20 REM by Tony Rudkin
   30 REM (c) Micro User
   40 REM For standard tele
text rom replace
   50 REM *TTXON in line 90
 with *TELESOFT
   60 REM and *TTXOFF in li
ne 200 with *ADFS, *DISC or
 *TAPE
   70 REM Add lines 1000 on
, from Program IIa or IIb
   80 MODE 7
   90 *TTXON
  100 *BBC1
  110 *PAGE 102
  120 *TRANSFER 6000
  130 PROCConvert(&6000)
  140 VDU 2:REM Printer On
  150 FOR R%=5 TO 23
  160 PROCGetText(&6000,R%)
  170 PRINT Text$
  180 NEXT R%
  190 VDU 3:REM Printer Off
  200 *TTXOFF
  210 END
```

Program III: Printing a news page

Owners of the Master series computers will have probably discovered the advantages of having a real time clock which they can use in their programs where time or date information is needed.

With a few additional lines of Basic, owners of BBC B Micros can also have access to an extremely accurate real-time clock using data recovered from teletext pages.

The techniques described earlier take a few seconds to extract text information once the teletext page has been transferred into memory, and this delay introduces an error which some users would consider to be unacceptable.

To overcome this problem, a dedicated routine is given in Program IV which extracts the time and date information in a much faster way – typically seconds.

PROCClockDate gets the time and date information and puts it into two Basic variables called *Clock$* and *Date$*. These can then be displayed on the screen or transferred to a printer or file.

```
   10 REM Clock for Standar
d Teletext rom
   20 REM by Tony Rudkin
   30 REM (c) Micro User
   40 MODE7
   50 PROCTimeDate
   60 PRINT"Time is "Clock$
   70 PRINT"Date is "Date$
   80 END
   90 :
 3000 DEF PROCTimeDate
 3010 *TELESOFT
 3020 *BBC1
 3030 *PAGE 100
 3040 *TRANSFER 7800
 3050 FOR I%=&7814 TO &7827
 3060 ?I%=?I% AND &7F
 3070 NEXT I%
 3080 ?&7828=13:?&7825=58
 3090 A$=$&7814
 3100 Clock$=RIGHT$(A$,8)
 3110 Date$=LEFT$(A$,10)
 3120 *DISC
 3130 ENDPROC
```

Program IVa: Clock for TFS rom

```
   10 REM Clock for ATS rom
   20 REM by Tony Rudkin
   30 REM (c) Micro User
   40 MODE7
   50 PROCTimeDate
   60 PRINT"Time is "Clock$
   70 PRINT"Date is "Date$
   80 END
   90 :
 3000 DEF PROCTimeDate
 3010 *TTXON
 3020 *BBC1
 3030 *PAGE 100
 3040 *TRANSFER 7800
 3050 FOR I%=&7816 TO &7829
 3060 ?I%=?I% AND &7F
 3070 NEXT I%
 3080 ?&782A=13:?&7827=58
 3090 A$=$&7816
 3100 Clock$=RIGHT$(A$,8)
 3110 Date$=LEFT$(A$,10)
 3120 *TTXOFF
 3130 ENDPROC
```

Program IVb: Clock for ATS rom

Master owners can also use the procedure as a very effective way of updating their real-time clocks by simply adding a line of the form:

```
25 TIME$=Clock$
```

This will reset the internal clock time in line with the teletext information and can be a useful routine for updating the clock whenever we change from Greenwich Mean Time (winter time) to summer time, as well as for taking out the odd few seconds of error which creep in over the weeks.

The techniques given here are just an introduction to what can be achieved by using simple teletext rom commands within Basic, and will allow you to develop personalised routines to access Ceefax and Oracle pages.

Even greater flexibility and speed can be achieved using more complex command forms, but the time savings thus gained are unlikely to be very important for most programs. ■

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Easier teletext

John Harris evaluates a replacement for the Acorn teletext adapter's TFS rom

THE Advanced Teletext System (ATS) rom from BBC Soft replaces the Teletext Filing System (TFS) rom originally supplied with Acorn's Teletext Adapter.

There are five main advantages that the ATS has over the TFS. You select pages by their numbers only, rather than having to press f0 first. Links between pages (now being broadcast by both BBC and ITV) are used to give a bottom line menu of four pages linked to the currently displayed page.

Linked pages are automatically stored in the computer as they are broadcast, so that they become instantly available.

The downloading of files is improved. And all broadcast data can be made available to your programs.

When using the system as a teletext terminal (like a teletext TV), you can select pages by entering the three-digit page number. With the TFS you have to prefix these three digits by pressing a function key (f0 – Select Page).

The old TFS accepts unprefixed number keys as link numbers, based on a hierarchical structure of linked pages. But the TFS was produced before the broadcasting authorities had finalised how these broadcast links would be implemented.

In practice few pages can be organised into strict hierarchies and the final implementation is much simpler. And the ATS makes full use of the new system.

There are several links, of which four are directly available in the form of four menu items – these are coloured red, green, yellow and blue. On the function key label f1 to f4 are patches of these colours.

The corresponding items on the screen are either the page numbers these keys select, or textual data sent by the teletext editors who prepare the information for broadcasting.

One of the links is to an index page using f0, but which index it gives you depends on the teletext editors. It may give you the nearest sub-index, the main index for the channel, or the alphabetical subject index.

The average time taken to receive a page, once it has been selected, depends on the interval between successive transmissions of the same page. However, if the teletext receiver stores the pages in ram before you select them, they can appear almost instantaneously.

There isn't sufficient ram in the BBC Micro to store the hundreds of pages broadcast on a channel, but the TFS allows you to select several to be continuously stored in ram and updated as broadcast.

The ATS has this facility as well (now on the Copy key), but also captures pages linked to the current page. As the links are on frequently-used routes (such as from index to sub-index and from headlines to news stories), average waiting time is cut dramatically.

The ATS also stores the page or sub-page received just before the one currently displayed. It can easily be restored to the screen with the Tab key – a relief when the sub-page you're reading is overwritten by the next one. You can toggle back again, also using the Tab key.

Pressing Return gives you a screenful of information on the page numbers of the current page (but not sub-page), links one to five, the index link, the first seven stored pages and the next. But I couldn't find an explanation of this in the guide.

This use of Return conflicts with its conventional use as a terminator. Such disregard of conventions is all too frequent and makes the use of computers frustrating and error-prone. To return to the current page, press the spacebar.

The TFS was designed to download broadcast *EXEC files – in other words the BBC Micro accepted them as if they had been typed at the keyboard. Only Basic programs could be downloaded, and then in an inefficient (untokenised) form.

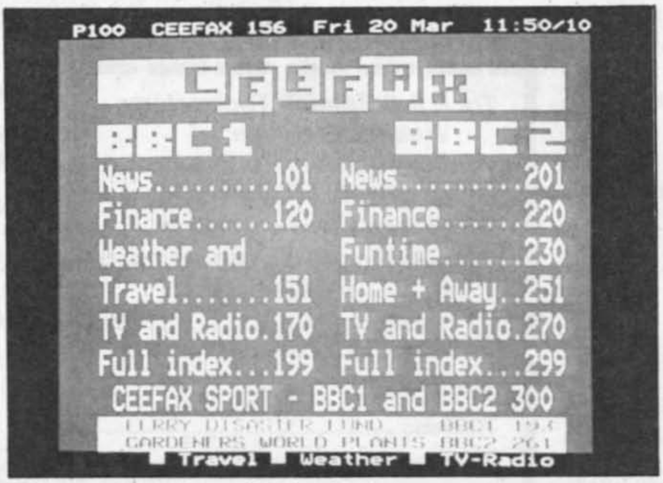
To remedy this the BBC broadcast a patch program that allowed the TFS to load tokenised Basic programs and to *LOAD text, machine code, screen dumps or anything that could be loaded straight into the micro's memory. The problem was that you had to store this patch on a disc or tape and load it each time you started a telesoftware session.

The ATS does away with all such problems. Pressing f5 downloads a catalogue of the files being broadcast on the current channel. This may take quite a few seconds because the ATS finds the page containing the information via a link on the main index page.

The catalogue appears on the screen together with instructions on how to select files for downloading. It operates as a scrollable menu and the software takes care of downloading it in the appropriate way for the type of file chosen.

In contrast to the TFS, the ATS keeps you informed about what you are

Turn to Page 48 ►



P100 CEEFAX 156 Fri 20 Mar 11:50/10

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Weather and Funtime......230
Travel.......151 Home + Away..251
TV and Radio.170 TV and Radio.270
Full index...199 Full index...299
CEEFAX SPORT - BBC1 and BBC2 300
FERRY DISASTER FUND BBC1 193
GARDENERS WORLD PLANTS BBC2 261
Travel Weather TV-Radio

ATS link menu on the bottom line of a teletext screen

◀ *From Page 47*

downloading. It displays the filename (as in the broadcast catalogue and used to save the downloaded file), the load and execute addresses, the number of blocks in the file and how many have so far been received successfully.

Each block of the file is also shown as a white square that turns green when it's successfully received, or red if there's an error, in which case the ATS will try again. An arrow shows which block was last received.

This is a vast improvement over the TFS. But it would be even better if you could select in one go all the files you want to download. You could leave the ATS to get on with it – something for the next release, perhaps.

There have been several changes to the * commands (called telesoft mode commands on the TFS and teletext operating system commands on the ATS). The ATS uses *TTX and *NOTTX to switch the adapter on and off. The prefix T can be used to avoid clashes with commands in other roms.

There are other new commands: *DATA allows the full data of a page (2k) to be transferred to a given memory address. With this your programs have access to all the broadcast data. *S4C is provided as an alternative to *CH4 and *ITV2 for Welsh users.

You can also type *MAGAZINE to stop the page numbers in the header flickering (when two or more magazines are broadcast in parallel). Only the selected magazine's page numbers are displayed.

There are changes in how *TRANSFER and *DISPLAY operate but *TELETEXT restores them to compatiblility with the TFS.

The undocumented commands *HON and *HOFF in the TFS are now documented in the ATS guide. Because the ATS isn't treated as a filing system, it doesn't use the TFS commands *EXEC and *OPT.

I have found three places where the TFS still scores over the ATS. It allows wildcards to be used in page number selections. This is useful when, for example, you see that an unusual page number, say between 890 and 899, is being broadcast and it isn't given in an index.

It's often difficult to see the exact page number, as the last figure is overwritten so fast. Being nosey, I use the wildcard to select. In this case 89# will show what's being broadcast.

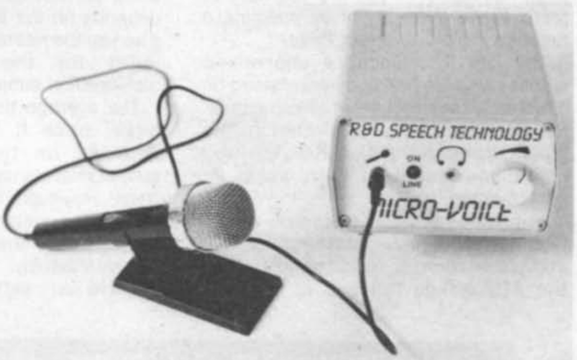
With the TFS you can use the Copy key to see which sub-page is currently displayed. I found no such facility on the ATS.

And there is a bug in the ATS. If the current page is rebroadcast after you've started (but haven't finished) entering a new page number, the number of the current page is reinstated over the figure or figures you've entered and you have to start again.

Luckily this doesn't happen very often, but it's very irritating when it does. Let's hope this will be put right in future versions.

But apart from this little bug the ATS is a great improvement on the TFS and is well worth the amazingly cheap price – which also includes a 64-page user guide.

Product: ATS rom
Price: £7.95
Supplier: BBC Soft, 35 Marylebone High Street, London W1M 4AA.
Tel: 01-580 5577



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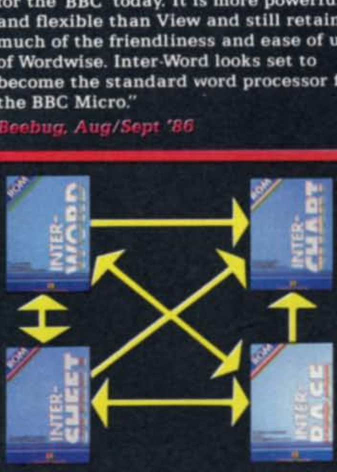
Review

> **"INTER-WORD is the most powerful and comprehensive word processor available for the BBC today. It is more powerful and flexible than View and still retains much of the friendliness and ease of use of Wordwise. Inter-Word looks set to become the standard word processor for the BBC Micro."**
>
> *Beebug, Aug/Sept '86*



Inter-Word is part of the 'ROM Link' series which is the only truly integrated suite of ROMs for the BBC micro.

£49.00+vat (£56.35)

Computer Concepts

Gaddesden Place, Hemel Hempstead,
Herts HP2 6EX, England.
Telephone (0442) 63933

• Block operations

These are common to most word processors, but with INTER-WORD any part of the text can be marked and then instantly moved, copied, deleted, printed, saved, underlined etc. There is no limit to the amount that can be marked.

• Automatic re-formatting

This enables the user to just type—no keys to press to re-format the paragraph after changes to the text or margins have been made; the margins on the rulers can simply be dragged, all text being instantly re-formatted to the new settings.

- **40, 53, 80 and 106 column screen modes**
- **Mail merge**
- **Integrates with all other parts of INTER family**
- **Automatic page numbering, with headers and footers**
- **Very fast and smooth scrolling**
- **Powerful search and replace facilities including wildcards, upper/lower case sensitivity, stored search and replace strings for instant re-use**
- **Automatic word count**
- **Fast simple cursor movement to any point**
- **Easily tailored to any printer**
- **Line numbering**
- **Selectable screen colours**
- **Compatible with the B, B+ and Master; Solidisk, Aries and Watford shadow RAM boards.**

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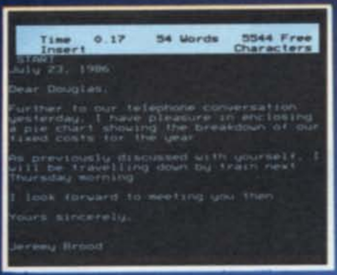
Compatible with all BBC Micros

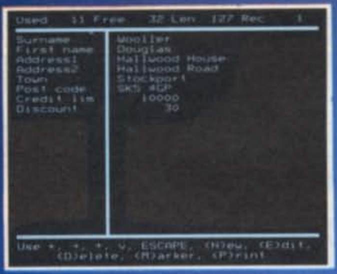
All this in just



```
Time   0.17    54 Words   5544 Free
Insert                    Characters
START
July 23, 1986

Dear Douglas,

Further to our telephone conversation
yesterday, I have pleasure in enclosing
a pie chart showing the breakdown of our
fixed costs for the year

As previously discussed with yourself, I
will be travelling down by train next
Thursday morning

I look forward to meeting you then

Yours sincerely,

Jeremy Brood
```

WORD PROCESSOR

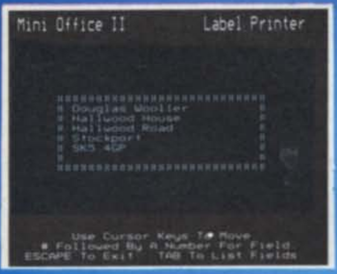
Compose a letter, set the print-out options using embedded commands or menus, use the mail merge facility to produce personalised circulars – and more!



```
Used   11 Free  32 Len  127 Rec    1
Surname       Wooller
First name    Douglas
Address1      Hallwood House
Address2      Hallwood Road
Town          Stockport
Post code     SK5 4GP
Credit lim       10000
Discount            30
Use ←, →, ↑, ↓, ESCAPE, (N)ew, (E)dit,
     (D)elete, (M)arker, (P)rint
```

DATABASE

Build up a versatile card index, use the flexible print out routine, do powerful multi-field sorting, perform all arithmetic functions, link with the word processor – and more!



```
Mini Office II              Label Printer

   ##############################
   #  Douglas Wooller           #
   #  Hallwood House            #
   #  Hallwood Road             #
   #  Stockport                 #
   #  SK5 4GP                   #
   #                            #
   ##############################

        Use Cursor Keys To Move
    # Followed By A Number For Field
  ESCAPE To Exit    TAB To List Fields
```

LABEL PRINTER

Design the layout of a label with the easy-to-use editor, select label size and sheet format, read in database files, print out in any quantity – and more!

70
60
50
40
30
20
10
0
J F M A M J J A S
PRODUCTION COSTS
cub
DATABASE SOFTWARE
Mini Office II
Mini Office II
Main menu
Word Processor
Database
Spreadsheet
Graphics
Communications
Label Printer
Exit Mini Office II
Use cursor keys to choose then press RETURN
(c) Database Software 1986

...and at a price

Mini Office II offers the most comprehensive, integrated suite of programs ever written for the BBC Micro – making it the most useful productivity tool yet devised.

A team of leading software authors were brought together to devote a total of 26 man years of programming to the development of Mini Office II. What they have produced is a package that sets new standards in home and business software.

The sample screenshots above illustrate just a few of the very wide range of features, many of which are usually restricted to software costing hundreds of pounds. Most are accessed by using cursor keys to move up and down a list of options and pressing Enter to select.

Is it that easy to use? Several leading reviewers have already sung its praises on this very point.

Yet possibly the best advertisement for Mini Office II is that it comes from the same stable that produced the original Mini Office package back in 1984.

That was so successful it was shortlisted in two major categories of the British Microcomputing Awards – the Oscars of the industry – and sold in excess of 100,000 units!

It was up to Mini Office II to take over where the first Mini Office left off, with 32 extra features, two additional modules, a program to convert existing Mini Office files to Mini Office II format, and a 60 page, very easy to follow manual.

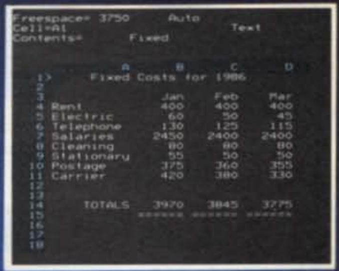
This is the package thousands of BBC Micro owners have been waiting for – and at a price everyone can afford!

ONE package!

CUMANA
BBC Micro

SPREADSHEET

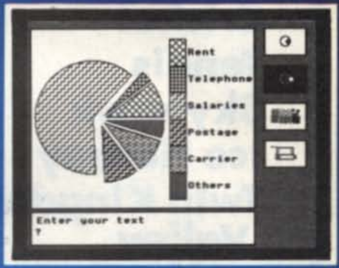
Prepare budgets or tables, total columns or rows with ease, copy formulae absolutely or relatively, view in either 40 or 80 column modes, recalculate automatically – and more!



```
Freespace= 3750     Auto
Cell=A1                   Text
Contents=      Fixed

               A       B       C       D
  1>      Fixed Costs for 1986
  2
  3                   Jan     Feb     Mar
  4 Rent              400     400     400
  5 Electric           60      50      45
  6 Telephone         130     125     115
  7 Salaries         2450    2400    2400
  8 Cleaning           80      80      80
  9 Stationary         55      50      50
 10 Postage           375     360     355
 11 Carrier           420     380     330
 12
 13
 14       TOTALS     3970    3845    3775
 15                ======  ======  ======
 16
 17
 18
```

GRAPHICS

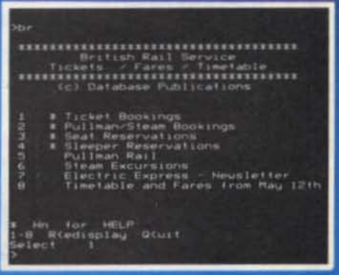
Enter data directly or load data from the spreadsheet, produce pie charts, display bar charts side by side or stacked, overlay line graphs – and more!



```
Enter your text
?
```

COMMS MODULE

Using a modem you can access services such as MicroLink and book rail or theatre tickets, send electronic mail, telex and telemessages in a flash – and more!



```
>br

 ****************************************
         British Rail Service
     Tickets  / Fares / Timetable
 ****************************************
      (c) Database Publications


 1    * Ticket Bookings
 2    * Pullman/Steam Bookings
 3    * Seat Reservations
 4    * Sleeper Reservations
 5      Pullman Rail
 6      Steam Excursions
 7      Electric Express - Newsletter
 8      Timetable and Fares from May 12th


*  Hn  for  HELP
1-8  R(edisplay  Q(uit
Select     1
>
```

that can't be matched!

Here's what some independent reviewers say about Mini Office II:

Menus throughout the program were abundant and well structured, allowing complex choices to be made with hardly a glance at the pocket-sized spiral-bound manual, and offering a wealth of user-defined functions . . . For the money it really is unbeatable. Dedicated word processors, spreadsheets and comms packages may offer some extra facilities, but some are so full of whistles and bells you may find yourself forever in the manual or even not using half of their power. What you get with Mini Office II is a valiant attempt to provide an all-embracing small business package at a down to earth price; it fulfills all its promises, and there's nothing cut-rate about the facilities it provides. – **Viewfax 258 (Prestel)**

Voted Business Program of the Year – 1985 AND 1986
"Popular Computing Weekly"

'This package is incredible value. It includes a word processor, database, spreadsheet, graphics display, label printer and communications module. You could well spend over £200 to get the same range of functions if you bought separate programs from other firms.'
"Daily Mail Home Computing Guide"

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DATABASE SOFTWARE

Order form on Page 167

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Ceefax line by line

Jeremy Brayshaw explains the secrets of teletext transmissions

CEEFAX is broadcast along with the BBC television picture. But have you ever wondered how? How can both a TV signal and the Ceefax pages be transmitted without interfering with each other?

The secret lies in the FBI. No, not the American G men but a section of the TV picture.

A normal TV picture is made up of a series of horizontal lines. If you look closely at a screen you may be able to see the individual rows of the picture. Some 625 lines are used to build up the complete frame. But where is teletext?

Each frame of the picture is drawn by an electron beam. This starts drawing the picture at the top lefthand corner. By the time it completes painting in one frame, the beam ends up pointing at the bottom righthand corner of the tube.

Before starting on the next frame of the picture, it has to move itself from the bottom right to the top left. During this time, it must not draw anything, otherwise a diagonal stripe would appear across the screen.

The process of moving the beam back to its starting position is called the Field Blanking Interval (FBI). During this time, the action of the TV tube must be suspended, or blanked, so as not to draw a stripe across the screen, even if the TV signal is still sending information.

In fact, the time taken during the FBI is about equivalent to that taken to send up to 25 TV picture lines. As these lines are not used for the TV picture, they are an ideal place to add teletext information.

Some of these extra lines (about six on each channel at the moment) are used to carry the teletext signal which is transmitted in binary form.

As the lines were designed to carry a picture, it is a simple process to code a line to carry binary data.

If the line is divided into equal length sections, each unit can represent one binary bit. If the section is black, this represents a zero, if white it represents a one.

In this way, a single television picture line is split up into 360 sections, which represent 45 eight bit bytes.

Most TV sets take less than 25 lines for the FBI so you can actually see these teletext data lines at the top of the normal TV picture by adjusting the vertical height control to pull the top of the screen down.

How, then, does a TV set cope with this? Well, a normal set without teletext capability simply treats them as any other picture line.

Any lines received during the FBI are effectively ignored and any received between the end of the FBI and the top of the picture are adjusted off the top of the screen.

If this is a teletext set, circuitry inside the receiver also detects and decodes these rows.

This circuitry is set to scan all the 25 lines transmitted during the FBI. It can detect which lines carry a teletext signal by the first three bytes on the row. If this produces rubbish, it ignores the rest of the line.

If, however, it detects a specific predefined pattern of white and black (representing the binary sequence 10101010 10101010 11100100) then it knows it has found a teletext signal and must decode the rest of the line.

The reason for the alternating 1 and 0 pattern of the first two bytes is simple. These bytes are used by the decoder to determine the size of each section of the line representing a single binary digit.

It measures the time taken for the section of the line to change from white (binary 1) to black (binary 0). Given a preset sequence of 1s and 0s it can work out the time taken for each bit to be sent, and apply this timing to the rest of the line.

These initial codes are used to set the internal clock of the decoder and are known as the clock run in sequence.

The problem of determining where each bit starts and ends may be solved with the clock run-in sequence, but how does the decoder know where each byte starts?

This is the purpose of the next byte, binary 11100100. As this is always the same number, and it always appears immediately after the clock run-in bytes, this sequence can be used to determine the start and end points of each byte.

All it does is to break the rest of the line into chunks equivalent in length to a single bit. It then groups these in units of eight, starting immediately after this 11100100 binary sequence, known as the framing code.

This leaves 42 bytes on each TV line, which are used by the decoder to form the teletext display. The first two are used to identify the row as belonging to a particular Ceefax page, and each of the remaining 40 bytes represents a character for display.

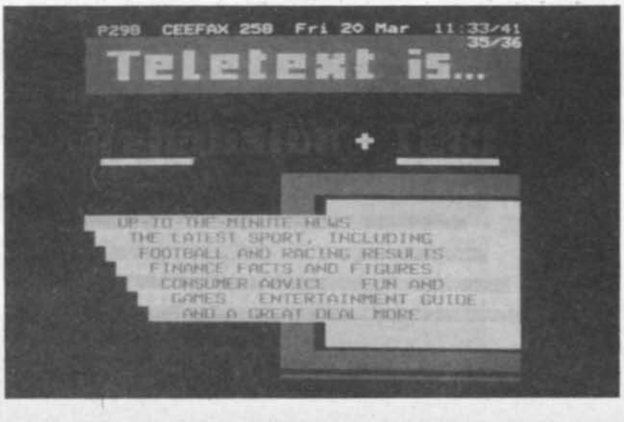
There are just 40 bytes of data on each television line. This directly relates to the length of a single row of text on a teletext display (40 characters).

As a teletext page requires 24 rows of text, this will take 24 television lines for its transmission. As only six TV lines can be used per transmitted picture frame, a single teletext page can be transmitted with every four frames.

This may seem a long time until we realise that a complete TV picture frame is transmitted every 1/50th of a second, so the Ceefax magazine can be broadcast at the rate of 12.5 teletext pages per second.

It takes on average around 15 seconds to transmit every available page. The speed of transmission is nearly seven million bits per second (actually 6.9375 Mbits/s), but as we have seen, the system can only use six of the 625 television picture lines.

Now if we could forget about the TV picture and use all 625 lines for teletext . . .



P298 CEEFAX 258 Fri 20 Mar 11:33/41
35/36

Teletext is...

UP-TO-THE-MINUTE NEWS
THE LATEST SPORT, INCLUDING
FOOTBALL AND RACING RESULTS
FINANCE FACTS AND FIGURES
CONSUMER ADVICE FUN AND
GAMES ENTERTAINMENT GUIDE
AND A GREAT DEAL MORE

PINEAPPLE SOFTWARE

Programs for the BBC models 'B' with disc drive with FREE updating service on all software

DIAGRAM

Still the only drawing program available for the BBC micro which gives you the ability to draw really large diagrams and scroll them smoothly around the screen stopping to edit them at any time if required.

Pineapple's unique method of storing the diagram information on disc means that the size of diagrams is limited only by the free space on disc, and not the amount of computer memory you have available. (A blank 80 track disc will allow up to 39 mode 0 screens of diagram).

The superb print routines supplied with the program enable large areas of the diagram to be printed in a single print run in a number of different sizes and rotated through 90 deg. if required. Full use can also be made of printers which have a wider than normal carriage available.

The program is fully compatible with the Marconi Tracker ball described below.

PLEASE STATE 40 or 80 TRACK DISC & WHETHER STANDARD BBC or MASTER VERSION IS REQUIRED

PRICE £25.00 + VAT

DIAGRAM UTILITIES

A suite of six utility programs which add additional features to the 'Diagram' drawing program. The utilities include the saving and loading of areas of diagram to and from disc. The ability to display the whole of your large diagram on the screen at one time (in either 4★4 or 8★8 screen format). The addition of borders and screen indents to diagrams, and the ability to shift a whole diagram in any direction.

PRICE £10.00 + VAT

MARCONI TRACKER BALL

This high quality device comes with it's own Icon Artmaster drawing program and utilities to enable it to be used in place of keyboard keys, joysticks, or with your own programs.

PRICE £60.00 + VAT p&p £1.75

PRICE INCLUDING 'DIAGRAM' SOFTWARE £79.00 + VAT p&p £1.75

TRACKER BALL for MASTER series

The Pointer ROM is supplied instead of the Icon Artmaster disc and enables the Tracker ball to work directly with the MASTER series computers. (e.g. to use with TIMPAINT etc.). Prices are the same as for the standard tracker ball.

POINTER

The Pointer Rom is available separately for people already owning tracker balls, and comes with instructions for use with the MASTER computer.

PRICE £12.50 + VAT

PCB

This new release from Pineapple is a printed circuit board draughting aid which is aimed at producing complex double sided PCB's very rapidly using a standard BBC micro and any FX compatible dot-matrix printer.

The program is supplied on EPROM and will run with any 32k BBC micro (including Master series). Also supplied is a disc containing a sample PCB layout to demonstrate the programs features.

By using an EPROM for the program code the maximum amount of RAM is available for storing component location and ASCII identification files etc. (Up to 500 components and 500 ASCII component descriptions may be stored for a given layout). These is no limit to the number of tracks for a given PCB, although the maximum size of board is restricted to 8" * 5.6".

Using a mode 1 screen, tracks on the top side of the board are shown in red, while those on the underside are blue. Each side of the board may be shown individually or superimposed. A component placement screen allows component outlines to be drawn for silk screen purposes and component numbers entered on this screen may be displayed during track routing to aid identification of roundels.

The print routines allow separate printouts of each side of the PCB in a very accurate expanded definition 1:1 or 2:1 scale, enabling direct contact printing to be used on resist covered copper clad board.

This program has too many superb features to describe adequately here, so please write or 'phone for more information and sample prinouts.

PRICE £85.00 + VAT

CONVERTER LEADS

Converter leads to enable the Trackerball to run mouse software and the mouse to run trackerball software (inc. DIAGRAM). Please state which way round when ordering.

PRICE £8.00 + VAT

MICROSPICE

A new addition to our range of engineering software. Microspice is a very powerful DC and AC analogue circuit simulator package for any model BBC computer.

As well as all the usual facilities available with this type of program, non-linear effects, small signal, noise measurements and sweeps may be performed. Component values may be swept, allowing component tolerances to be investigated as well as thermal performance etc. Comprehensive transistor modelling is incorporated using a 20 parameter Ebers Moll description. The program is supplied on disc with a very comprehensive 49 page manual.

Please write or 'phone for more information

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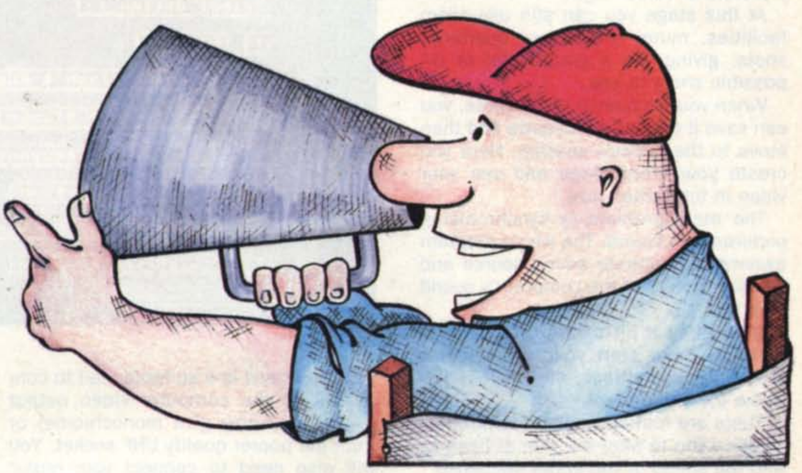
Tel: 01-523 2059. Also at Potters Bar 0707 46826
PLEASE CALL FOR BULK AND INSTITUTIONAL PRICES

Rog Frost samples the delights of being in the TV director's seat

Action . . . roll 'em!



THE tension mounts as you sit at your director's console. You switch the recording light to red and cue the soundtrack.

Before you is a choice of 16 camera shots – which one should you select now for transmission? One moment of indecision and you'll have to call "Cut!" and start recording again.

That's the excitement offered to you by Squirrel Software with their latest release, TV Director. In fact, you get the chance to design, produce and direct your own videos using nothing more than your trusty computer.

There are, inevitably, a number of limitations, so you won't get a top class animated video, but you will experience the thrill and pressure of video work. The possible uses, as the cliché goes, are only limited by your imagination.

The first stage in the video-making process is to turn off the computer and plan on paper what you want to do. You can create up to 16 different camera shots. A picture-making routine is included within the program for this purpose.

At first sight, the graphics will be disappointing. The screen is divided into a grid of 32 by 24 blocks and a single block is the smallest area that can be defined. This results in pictures being chunkier than those on teletext systems.

The reason for these chunky graphics is that the data for an entire picture is stored in 384 bytes. It is thus possible to store 16 pictures in memory and swap them around with great speed.

A bonus of this style of graphics is that pictures are created quickly. You move a cursor around with keys or joystick and then hit the required colour number to set that block.

If you can't remember colour numbers, then hitting the spacebar will bring up the Help page. This also gives details of special effects such as zoom in or out, mirror images, inverting or quartering. All can be achieved by single key presses.

Product: TV Director
Price: £14.95 (disc only)
Supplier: Squirrel Software, 4 Bindloss Avenue, Eccles, Manchester M30 ODU.
Tel: 061-789 4120

The BBC Micro version operates in Mode 2 and thus allows the full range of eight steady and eight flashing colours. Simple animation, such as a person talking, can be achieved by use of flashing colours.

There is no option to change the palette. This means that once you have painted an area, the only way to change it is to re-paint it.

The program works with blocks of frames and normally you would save such a block of up to 16 pictures.

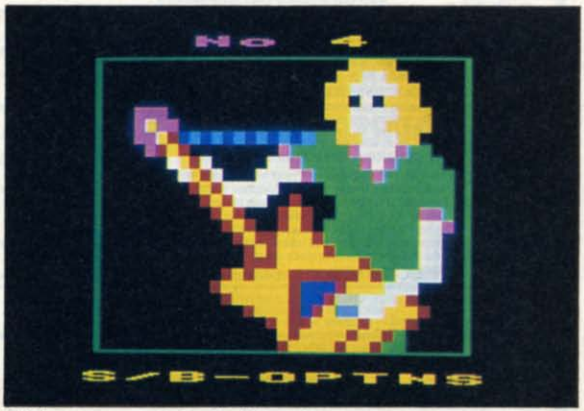
A sensible option allows the storage of single pictures. This makes it possible for a team of people to work on separate machines and then merge their work into one block.

With the artwork completed, you are ready to move to the studio and produce the video. A display of eight monitors is shown and the other eight pictures are toggled in with the spacebar. A central "transmission" monitor shows the currently selected camera shot.

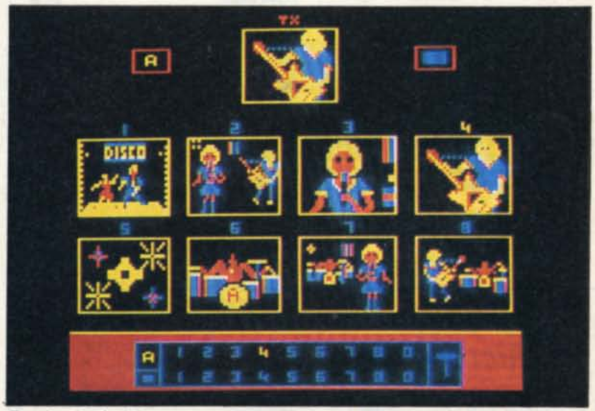
It's as well to practice a bit first with the recording light on blue, but when you are ready you switch that light to red, cue the sound and you're away.

You cut to different cameras by hitting the appropriate camera number, and it

Turn to Page 56 ▶



Editing a camera shot – flashing colours are used to produce a stunning effect



The bank of eight camera shots. Notice that camera four is 'live'

◀ *From Page 55*

is possible to mix or fade shots with joysticks or cursor keys.

At this stage you can still use zoom facilities, mirror imagery or quartered shots, giving you a grand total of 64 possible shots to use.

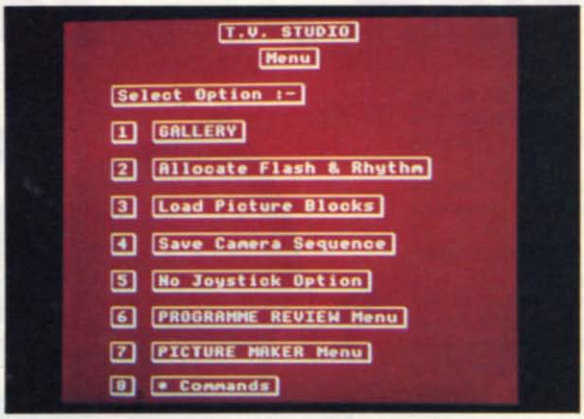
When your sequence is complete, you can save it on disc or cassette and then move to the preview session. Here you create your credit page and see your video in full screen size.

The main problem is synchronising pictures with sound. The whole program assumes a separate sound source and no use is made of the computer's sound chip.

It requires a bit of trial and error to know when to start your sequence to match the soundtrack, but practice will make (nearly) perfect.

There are features within the program to allow you to alter the rate of flashing and the speed of the entire sequence.

If you have a video recorder you'll only need to achieve perfection once, since you can replay it all from the video machine.



The options available in the TV Studio program

All you need is a suitable lead to connect it to the computer video output (which may only give monochrome) or from the poorer quality UHF socket. You will also need to connect your music source to the video recorder's audio in socket.

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GALLERY

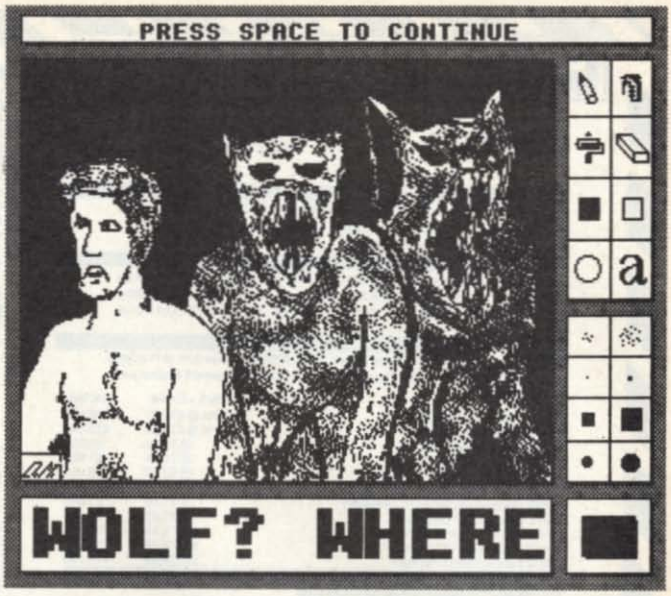
No. 2

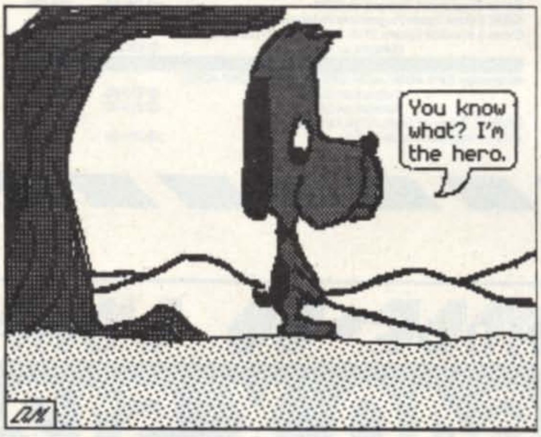
THE start of the Gallery feature in our March issue has certainly brought out the artists among you. Since it appeared, more superb pictures have been coming in from readers.

Here's another collection by talented reader Peter Clifton.

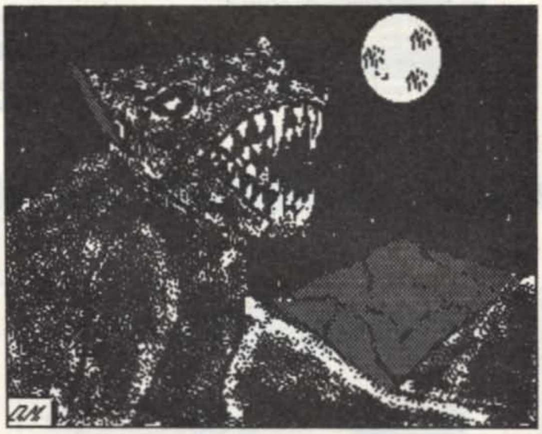
Keep them coming in – you may see your own masterpieces in print in future issues.

The address to send them to: Gallery, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

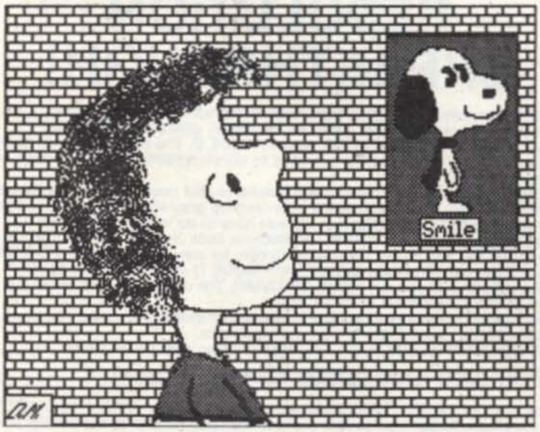

PRESS SPACE TO CONTINUE
WOLF? WHERE


You know what? I'm the hero.

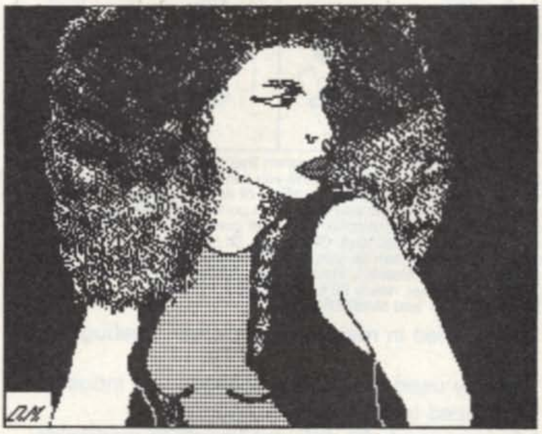
Droopy



Bark at the moon



Smile



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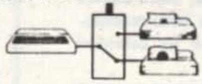

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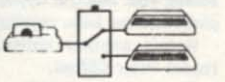

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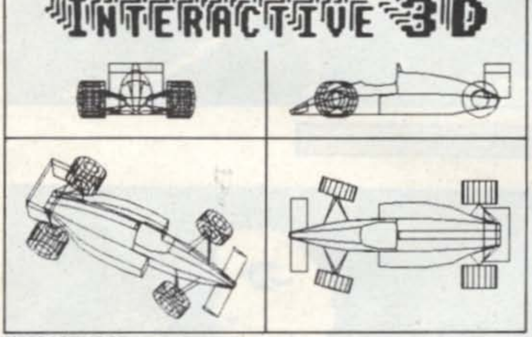

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Roland Waddilove concludes his series on writing machine code arcade games

Let's bounce a sprite

MACHINE CODE GAMES

Part 5

WE have in this series been developing the routines and techniques required for writing machine code arcade games. We've discussed animation, collision detection and tracking sprites which follow a set pattern.

Now it is time to move on to bouncing sprites.

These are commonly found in multi-screen ladders and levels-type arcade games, bouncing between walls, climbing up and down ladders, running back and forth along the platforms and so on.

A window can be defined for each bouncer, and the sprites will automatically bounce within them. They may move horizontally, vertically, in all directions or stay still. Each sprite may be animated and different from the others in size and shape.

To see bouncing sprites in action enter and run this month's program. You'll see four boxes on the screen, each containing a ball.

One bounces in all directions, one left and right off the walls, one up and down. The last remains where it is.

The walls are unimportant, and are there only to define the windows' edges. If you erase them the balls will still bounce in the correct positions.

Before writing a machine code routine to perform this sort of animation it is essential to structure the data. Once this is done the programming becomes much simpler.

Figure I shows the data structure. Each bouncing sprite requires a 20 byte information block, and all must fit in one page of memory for easy indexing with the X register.

The first four items in the block, bytes 0 to 7, are pointers to the sprite data for four frames of animation. You don't have to have four-frame animation, and could, in fact, make them all the same – the facility is available if required.

This enables each bouncer to be different from the others: Tracking sprites, as we saw last month, are all the same.

Byte 8 stores the current frame of animation, which, incidentally, runs 0, 2, 4, 6 and not 1, 2, 3, 4.

Byte 9 stores various flags – seen in Figure II. Bit 0 shows the horizontal direction, left or right, bit 2 the vertical direction, up or down. Bit 1 or bit 3 – if zero – means don't bother moving it.

The effect is that if bits 1 and 3 are set the sprite will bounce in all directions. If only bit 1 is set it will bounce left and right, and if bit 3 is set it will go up and down.

Of course if they are both zero the sprite stays put, though it is still animated.

Bit 7 of the flags shows whether the character is on screen.

Bytes 10 and 11 of the information block store the current address, and 12 and 13 hold the x and y coordinates. Don't forget that the screen is 80 bytes wide and 256 deep.

Bytes 14 and 15 store the sprite's size in columns and rows. Each sprite may be the same or different from the others. I've used the same sprite throughout to save you entering masses of data.

Bytes 16 to 19 set the left, right, top and bottom edges of the bouncer's window. The sprites move vertically in steps of two (to even out the fine vertical but coarse horizontal resolution of the screen) so the top and bottom edges and the y coordinate must be all odd or all even numbers.

You must set up each bouncer information block correctly before calling the machine code. You can see this in PROCbouncer_table. It reads four lines of data and stores them in page 9.

To change the sprites, windows, direction and animation all you need to change are four data statements. This simplicity enables you to have large numbers of screens in your game.

If you've followed this series from the start you should by now have all the routines you need to write your first arcade game.

The machine code is structured and the subroutines are quite general, so they can be extracted easily and inserted into other programs.

● *And that's the end of this series. I haven't covered every possible machine code games technique, in fact I've barely scratched the surface, but we have covered enough to get you started. Have fun exploring further!*

Byte	Function
0	data0
2	data1
4	data2
6	data3
8	frame
9	flags
10	address
12	x
13	y
14	columns
15	rows
16	min x
17	max x
18	min y
19	max y

Figure I: Structure of the bouncer information block

Bit	Function
0	1=move left, 0=move right
1	1=move horizontally, 0=leave alone
2	1=move up, 0=move down
3	1=move vertically, 0=leave alone
4	Not used
5	Not used
6	Not used
7	1=On screen

Figure II: Structure of the flags byte

```
   10 REM Bouncing Sprites
   20 REM By R.A.Waddilove
   30 REM (c) Micro User
   40 MODE 7:*TV255,1
   50 RESTORE 1720:FOR I%=0 TO 191:READ
J%:I%?&C00=J%:NEXT
   60 PROCbouncer-table
   70 PROCassemble:CLEAR
   80 MODE 2:*FX16
   90 VDU 23;8202;0;0;0;
  100 DRAW 0,1023:DRAW 1278,1023
  110 DRAW 1278,0:DRAW 0,0
  120 MOVE 640,0:DRAW 640,1024
  130 MOVE 0,512:DRAW 1280,512
  140 CALL &980
  150 END
  160
  170 DEF PROCassemble
  180 old=&70:new=&72
  190 rows=&74:columns=&75
  200 temp=&76:temp1=&78:temprows=&7A
  210 osbyte=&FFF4
  220 number-of-bouncers=4*20
  230 number=&80
  240 FOR pass=0 TO 2 STEP 2
```

◀ From Page 59

```
  250 P%=&980
  260 [ OPT pass
  270
  280 JSR initialise
  290 .main-loop
  300 JSR move-bouncers
  310 LDA #&81:LDX #256-113:LDY #&FF:JSR
 osbyte  \Escape?
  320 TYA:BEQ main-loop
  330 RTS
  340
  350 .initialise
  360 LDX #number-of-bouncers
  370 .loop
  380 STX number
  390 LDA bouncer+9,X:AND #&80:BEQ next-
init \put on screen?
  400 LDA bouncer,X:STA newdata+1:LDA bo
uncer+1,X:STA newdata+2 \data
  410 LDY bouncer+13,X:LDA bouncer+12,X:
TAX:JSR convert \get address
  420 LDX number
  430 LDA new:STA bouncer+10,X:LDA new+1
:STA bouncer+11,X \store it
  440 LDY bouncer+15,X:LDA bouncer+14,X:
TAX:JSR put
  450 .next-init
  460 SEC:LDA number:SBC #20:TAX
  470 BNE loop
  480 RTS
  490
  500 .move-bouncers
  510 LDX #number-of-bouncers
  520 .loop
  530 STX number
  540 LDA bouncer+9,X:AND #&80:BEQ next-
bouncer \on screen?
  550 CLC:TXA:ADC bouncer+8,X:TAY \point
 to data
  560 LDA bouncer,Y:STA olddata+1:LDA bo
uncer+1,Y:STA olddata+2
  570 CLC:LDA #2:ADC bouncer+8,X:AND #7:
STA bouncer+8,X \next frame
  580 CLC:TXA:ADC bouncer+8,X:TAY \point
 to data
  590 LDA bouncer,Y:STA newdata+1:LDA bo
uncer+1,Y:STA newdata+2
  600 LDA bouncer+10,X:STA old:LDA bounc
er+11,X:STA old+1 \old address
  610 JSR get-new-xy
  620 LDY bouncer+13,X:LDA bouncer+12,X:
TAX:JSR convert \get address
  630 LDX number
  640 LDA new:STA bouncer+10,X:LDA new+1
:STA bouncer+11,X \store it
  650 LDY bouncer+15,X:LDA bouncer+14,X:
TAX:JSR print
  660 .next-bouncer
  670 SEC:LDA number:SBC #20:TAX
  680 BNE loop
  690 CLI
  700 RTS
  710
  720 .get-new-xy
  730 LDA bouncer+9,X:AND #8:BEQ leftrig
ht \going up-down?
  740 LDA bouncer+9,X:AND #4:BEQ down \w
hich?
  750 DEC bouncer+13,X:DEC bouncer+13,X
\y=y-2
  760 JMP ud1
  770 .down
  780 INC bouncer+13,X:INC bouncer+13,X
\y=y+2
  790 .ud1
  800 LDA bouncer+13,X
  810 CMP bouncer+18,X:BEQ ud2:CMP bounc
er+19,X:BNE leftright
  820 .ud2
  830 LDA bouncer+9,X:EOR #4:STA bouncer
+9,X \reverse y direction
  840 .leftright
  850 LDA bouncer+9,X:AND #2:BEQ exit-ge
t-xy \moving left-right?
  860 LDA bouncer+9,X:AND #1:BEQ right \
which?
  870 DEC bouncer+12,X \x=x-1
  880 JMP LR1
  890 .right
  900 INC bouncer+12,X \x=x+1
  910 .LR1
  920 LDA bouncer+12,X
  930 CMP bouncer+16,X:BEQ LR2:CMP bounc
er+17,X:BNE exit-get-xy
  940 .LR2
  950 LDA bouncer+9,X:EOR #1:STA bouncer
+9,X \reverse direction
  960 .exit-get-xy
  970 RTS
  980
  990 .put
 1000 LDA #&80:STA old:STA old+1
 1010 .print  \uses new/old/X=rows/Y=col
umns/olddata/newdata
 1020 STX columns:STY rows
 1030 LDX #0:LDY #0
 1040 LDA new:STA temp1:LDA new+1:STA te
mp1+1
 1050 LDA old:STA temp:LDA old+1:STA tem
p+1  \save address of column
 1060 .loop1
 1070 LDA rows:STA temprows
 1080 .loop2
 1090 .newdata LDA &3000,X:EOR (new),Y:S
TA (new),Y
 1100 .olddata LDA &3000,X:EOR (old),Y:S
TA (old),Y
 1110 INX
 1120 LDA old:AND #7:CMP #7:BEQ bottom1
 1130 INC old:BNE next1:INC old+1:JMP ne
xt1
 1140 .bottom1 \row
 1150 CLC:LDA old:ADC #&79:STA old:LDA o
ld+1:ADC #2:STA old+1
 1160 .next1
 1170 LDA new:AND #7:CMP #7:BEQ bottom2
 1180 INC new;BNE next2:INC new+1:JMP ne
xt2
 1190 .bottom2
 1200 CLC:LDA new:ADC #&79:STA new:LDA n
ew+1:ADC #2:STA new+1
 1210 .next2
 1220 DEC temprows:BNE loop2  \next row
 1230 CLC:LDA temp1:ADC #8:STA new:STA t
emp1:LDA temp1+1:ADC #0:STA new+1:STA te
mp1+1
 1240 LDA temp:ADC #8:STA old:STA temp:L
DA temp+1:ADC #0:STA old+1:STA temp+1
 1250 DEC columns:BNE loop1  \next colum
n
 1260 RTS
 1270
 1280 .convert   \X,Y -> address in new
 1290 LDA #0:STA new+1:TXA:ASL A:ASL A:R
OL new+1:ASL A:ROL new+1:STA new \X*8
 1300 TYA:AND #7:ADC new:STA new:LDA new
+1:ADC #0:STA new+1 \ +(Y MOD 8)
 1310 TYA:LSR A:LSR A:LSR A:ASL A:TAY  \
2*(Y DIV 8)
 1320 LDA table,Y:ADC new:STA new:LDA ta
ble+1,Y:ADC new+1:STA new+1
 1330 RTS
 1340
 1350 .table
 1360 OPT FNtable
 1370 ]
 1380 NEXT
 1390 ENDPROC
 1400
 1410 DEF PROCbouncer-table
 1420 bouncer=&900:P%=bouncer+20
 1430 RESTORE 1590
 1440 FOR I%=1 TO 4
 1450 READ bdata0,bdata1,bdata2,bdata3
 1460 !P%=bdata0:P%!2=bdata1:P%!4=bdata2
:P%!6=bdata3
 1470 READ bframe,bflags
 1480 P%?8=bframe:P%?9=bflags
 1490 READ baddress,bx,by
 1500 P%!10=baddress:P%?12=bx:P%?13=by
 1510 READ bcols,brows
 1520 P%?14=bcols:P%?15=brows
 1530 READ bmaxx,bminx,bmaxy,bminy
 1540 P%?16=bmaxx:P%?17=bminx:P%?18=bmax
y:P%?19=bminy
 1550 P%=P%+20
 1560 NEXT
 1570 ENDPROC
 1580
 1590 DATA &C00,&C00+48,&C00+2*48,&C00+3
*48,0,&8A,0,18,40,4,12,35,1,114,2
 1600 DATA &C00,&C00+48,&C00+2*48,&C00+3
*48,0,&8C,0,56,8,4,12,75,31,114,2
 1610 DATA &C00,&C00+48,&C00+2*48,&C00+3
*48,0,&83,0,8,184,4,12,35,1,200,128
 1620 DATA &C00,&C00+48,&C00+2*48,&C00+3
*48,0,&80,0,56,180,4,12,0,0,0,0
 1630
 1640 DEF FNtable
 1650 FOR I%=0 TO 31
 1660 ?P%=(&3000+I%*&280)MOD256
 1670 P%?1=(&3000+I%*&280)DIV256
 1680 P%=P%+2
 1690 NEXT
 1700 =pass
 1710
 1720 REM BALL0
 1730 REM X=4/Y=12
 1740 DATA 0,1,1,3,15,7,7,15,3,1,1,0,3,3
,3,3,15,15,15,15,3,3,3,3,7,3,3,3,15,7,7,
15,3,3,3,7,0,2,2,3,15,15,15,15,3,2,2,0
 1750 REM BALL1
 1760 REM X=4/Y=12
 1770 DATA 0,1,1,3,15,11,11,15,3,1,1,0,3
,3,3,3,15,15,15,15,3,3,3,3,11,3,3,3,15,1
1,11,15,3,3,3,11,0,2,2,3,15,15,15,15,3,2
,2,0
 1780 REM BALL2
 1790 REM X=4/Y=12
 1800 DATA 0,1,1,3,15,15,15,15,3,1,1,0,7
,3,3,3,15,7,7,15,3,3,3,7,3,3,3,3,15,15,1
5,15,3,3,3,3,0,2,2,3,15,7,7,15,3,2,2,0
 1810 REM BALL3
 1820 REM X=4/Y=12
 1830 DATA 0,1,1,3,15,15,15,15,3,1,1,0,1
1,3,3,3,15,11,11,15,3,3,3,11,3,3,3,3,15,
15,15,15,3,3,3,3,0,2,2,3,15,11,11,15,3,2
,2,0
```

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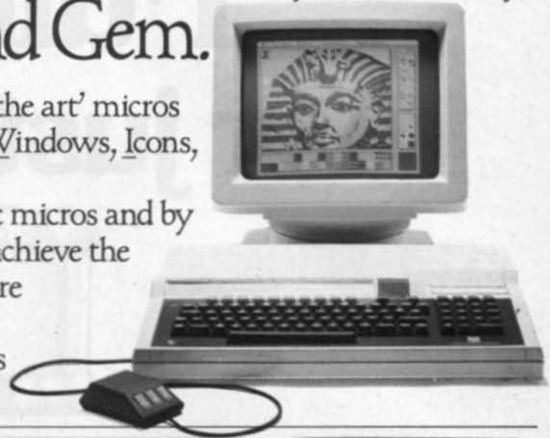

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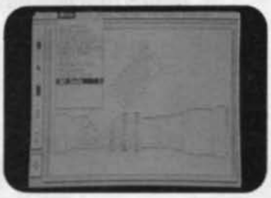

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Repeat without going loopy

LAST month saw us explore pseudocodes FOR . . . DO, the structure shown in Figure I. This allowed us to repeat whatever came between the FOR and the ENDFOR, the body of the loop, a fixed number of times.

```
FOR a number of times DO
    something
    something else
ENDFOR
```

Figure I: A fixed number of repetitions

Useful as this is, it's often the case that we don't know how many times we want a loop to repeat. This happens all the time. We tell people "While there's a spud left in the bucket, keep on peeling" and we've all met people who, while there's food in the fridge, will keep on eating.

In programming we frequently want an action to continue while a condition is true. For instance, we may want an accounting program to continue dealing with a customer's transactions while they're inside their credit limit.

Yet again, we may wish a game to continue while the player's still got a life left.

This repetition of an action or a set of actions depending on a condition is one of the basic building blocks of programming. And, unsurprisingly, pseudocode reflects this with the WHILE...DO structure, illustrated in Figure II.

```
WHILE condition is true DO
    action
    action
ENDWHILE
```

Figure II: The WHILE . . . DO structure

It's easy to see how it works. The first line of the loop, the WHILE . . . DO, tests to see if the condition between the WHILE and the DO is true. If it is, the body of the loop – the statements sandwiched between the DO and the ENDWHILE – are performed once.

Then the loop goes back to the beginning and the condition is checked again. If it's true the body of the loop is performed once more.

This cycle of checking the condition and then repeating the body of the loop carries on until the condition is found to be false. Then the loop stops.

Figure III shows the WHILE . . . DO loop as applied to getting our editor to buy the drinks. The condition is that the pub is open.

While this is true the body of the loop – getting the ale in – is performed. When the condition stops being true, the loop ends and the editor stops buying rounds.

```
while the pub is open do
    go to bar
    buy drink
    consume drink
endwhile
```

Figure III: While the editor's in the pub . . .

Now the editor usually arranges matters so that he arrives at the pub just on closing time. This means that the pub is shut and he doesn't have to buy the drinks.

In other words, the condition between the WHILE and the DO is false, so the body of the loop – buying his round – is ignored.

This is an important feature of the WHILE...DO loop. Should the condition be false when the program comes to the loop for the first time, the whole loop is ignored.

It's as though all the code between WHILE and ENDWHILE doesn't exist, and the program goes on to the next statement, if any.

So if the condition is initially false, the WHILE loop just doesn't happen. Nothing inside the body of the loop is performed.

Of course if the condition is true then, as we've seen, the loop is performed at least once and repeated until the condition becomes false. Then the loop ends.

This is known as the algorithm "dropping out of" the loop.

Notice one thing. For the loop to stop, the condition which was originally true (which must be the case or else the loop would have been ignored) must have become false. And the only way for this to happen is for the body of the loop to cause some change in that condition.

If this didn't happen the condition would always be true and the loop would cycle endlessly. The moral is that you should always make sure that something inside the body of the loop changes the condition that decides whether the loop repeats.

You'll see this in the pseudocode fragment of Figure IV.

```
set total to zero
set count to zero
get number

while number is not zero do
    add number to total
    add 1 to count
    get number
endwhile

set average to total divided by count
display average
```

Figure IV: An average piece of pseudocode

This is a fairly straightforward piece of code that takes a series of numbers, keeps a running total and then works out the average.

Rather than a FOR . . . DO loop, which assumes that we know the number of numbers we're going to enter, the more flexible WHILE . . . DO is used. This keeps on repeating until the number given to the program is zero.

Looking at Figure IV's code in detail, the first two lines just tell us that two variables are to be used, *total* and *count*, and these are both to be set to zero at the start of things.

You can look on these variables rather like the *x* and *y* which "stand for" numbers in algebra problems. The third line just looks to the keyboard for a value and puts this into *number*.

The next lines form the WHILE...DO loop. First of all the value of *number* is checked. If this is 0, the initial condition is false and the loop is ignored.

Leaving that possibility for the moment, suppose that *number* is anything but 0. Then the loop condition is true and the code between the DO and ENDWHILE is performed.

This adds *number* to *total* and increments *count* to keep track of the number of numbers accepted by the loop. Then another value of *number* is requested from the keyboard.

Once this has happened, the ENDWHILE sends the algorithm back to test the loop condition. If the value of *number* is 0 then the loop ends or else it continues, cycling until eventually *number* is 0. At this point the algorithm drops out of the loop and goes on to the next two lines. These divide *total* by *count*, storing the result in *average*, which is then displayed.

Remember what was said earlier about there having to be something in

Turn to Page 64 ▶

◀ **From Page 63**

the body of the loop that changed the loop condition or else once the loop was entered it would carry on forever?

In this case it's the "get number" statement. This allows you to enter 0 and so make the loop condition false, ending the repetition.

Can you see anything wrong with the code in Figure IV? What if an evil-minded user gives *number* an initial value of 0?

As we've seen, this means that the loop is ignored and the algorithm goes on to the following two lines. But in this case *count* still holds the value 0 and the algorithm tries to divide *total* by this. And you can't divide by zero.

So Figure IV's algorithm has a potential flaw in it. We'll see how to remedy this next month.

```
total=0
count=0
get number

while number <> 0 do
   total=total+number
   count=count+1
   get number
endwhile

average=total/count
display average
```

Figure V: Rather more symbolic pseudocode

For the moment have a look at Figure V. This is exactly the same algorithm as the one in Figure IV, the only difference being the way it is expressed.

In Figure IV, the statements are close to English and relatively informal. In Figure V the pseudocode is very formal and precise, nearly mathematical. It almost reads like Basic.

And that's why I prefer Figure IV's method of expression to Figure V. The more symbolic, precise code has me automatically thinking in terms of Basic, while that in Figure IV could be translated into Pascal or assembler or whatever. It's more fluid and, for me at any rate, preferable.

The choice of method is up to you. I like to put off making decisions as long as possible, using mini-algorithms to take care of details. I must admit that as I get further into these, the pseudocode starts to look like Figure V's code as I get down to fairly basic, nitty-gritty operations.

But at the higher levels of the algorithm I tend to use the rather freer mode of expression shown in Figure IV. It allows me to think of the main features of the algorithm without being bogged down by details. They can come later as I get into the mini-algorithms.

While we're on the subject of repetitions, there is another pseudocode structure which allows us to repeat sections of code over and over. This is the REPEAT . . . UNTIL loop. Corresponding to a real life instruction such as "Keep on doing it until you get it right", it takes the form shown in Figure VI.

```
REPEAT
   action
   action
   action
UNTIL condition is true
```

Figure VI: The REPEAT . . . UNTIL structure

Here the body of the loop, the statements that are to be repeated, are sandwiched between the REPEAT and the UNTIL. The condition that is tested comes after the UNTIL.

And that's an important point. With a REPEAT...UNTIL loop, the body of the loop is performed and *then* the condition is tested. If the condition is true the loop stops, otherwise the body of the loop is repeated, followed by the condition being tested again and so on.

Figure VII shows how this applies to our editor, while Figure VIII shows it in use in a very simple algorithm.

```
repeat
   go to bar
   buy drink
   consume drink
until closing time
```

Figure VII: The editor's round – again

```
repeat
   get a number
   double number
   display result
until number is zero
```

Figure VIII: REPEAT . . . UNTIL in action

Here the body of the loop consists of a request for a number which is then doubled and displayed. Once this is done the code tests to see if the number is 0. If it is the loop stops. If it isn't, the loop repeats with another request for a value.

One thing to notice is that the body of the loop must be performed at least once, because the loop condition isn't tested until after the body of the loop.

Suppose the user replies 0 to the first request. The algorithm will take this value, storing it in *number*. The next line doubles this, again storing it in *number*.

The fact that twice 0 is 0 is neither here nor there to the algorithm, it carries on regardless.

The third statement displays the value in *number* and then – and only then – is the loop condition met. Now, since it's true that *number* is 0, the loop terminating condition is met and the loop ends.

```
get number
while number not equal to zero do
   double number
   display number
   get number
endwhile
display number
```

Figure IX: The WHILE . . . DO alternative

So the loop must be performed at least once (when *number* is 0) and possibly many times.

To sum up, the REPEAT . . . UNTIL loop is always performed at least once. The loop condition is tested at the end of the body of the loop and the loop stops when this condition is true.

This is in marked contrast to the WHILE . . . DO loop which may not be performed at all. This tests the loop condition *before* entering the body of the loop, the loop keeping on repeating while this condition is true.

Having talked about how to use REPEAT . . . UNTIL loops I'll now tell you that they're not really necessary. Anything that you can do with a REPEAT . . . UNTIL loop, you can express as a WHILE . . . DO loop.

Because of this, some people just stick to WHILE..DO loops, looking down on the use of REPEAT...UNTIL in pseudocode.

I prefer the flexibility allowed by having both structures. Sometimes I think in WHILEs – *"While the debts are less than £100 I won't worry"* – sometimes in UNTILs – *"I won't worry until the debt is £100 or more"*.

I find it easier to use structures that mimic the way I think about problems rather than twist my thoughts to fit someone's rules for pseudocode.

Even if you do replace REPEAT . . . UNTILs with WHILE . . . DOs, it can be a bit messy. Figure IX shows a translation of Figure VIII into a WHILE...DO loop. Nasty, isn't it?

And that's where we leave our exploration of pseudocode for this time. So far we've covered breaking down our problems into smaller and smaller units, using mini-algorithms as necessary.

We've followed the principle of never do in one bit of code what can be put off until another, dividing the problem into ever simpler tasks.

Not content with just having a sequence of commands, one statement following another, we've also learned about repetition. Now we have three ways of performing a section of code over and over a required number of times.

● *Next month we'll be looking at how we can take decisions in pseudocode.*

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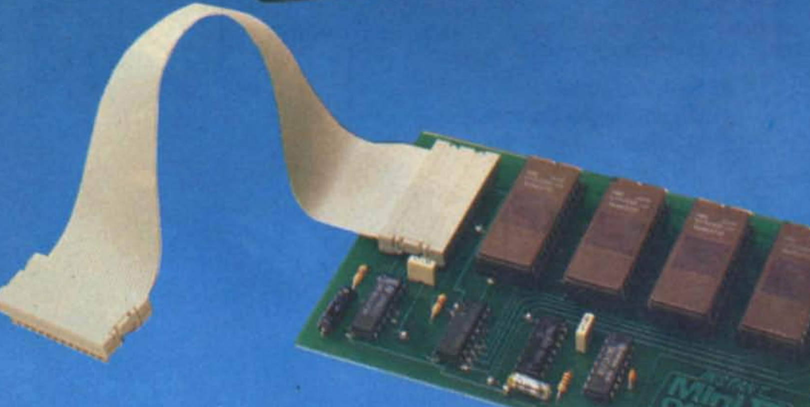

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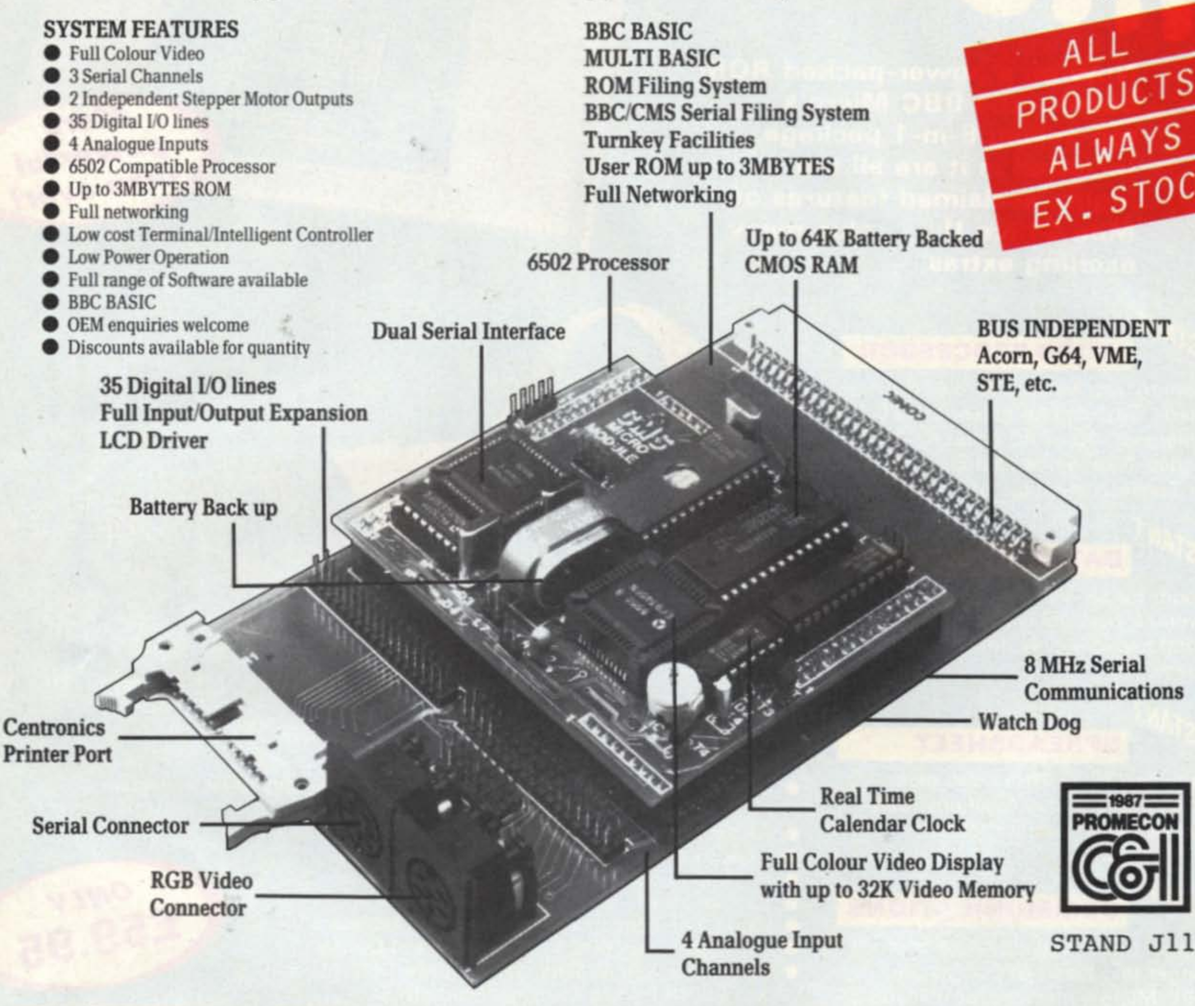
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Astrid gets a boost

ASTRID, the device that allows a BBC Micro to listen to satellites, has been given a new lease of life.

Inventor Steve Webb has left Astrid's original manufacturer, MM Microwave, to start up his own business, SRW Communications.

"There was no money available for promoting Astrid at MM Microwave", Webb told *The Micro User*, "and although word-of-mouth publicity helped sell it to about 250 educational establishments and serious micro users, the product was getting nowhere near the exposure it deserved.

"Now I've taken Astrid back I can promote it actively. Already it has been accepted by leading educational equipment distributors Phillip Harris and I'm now confident of healthy sales in 1987".

The revolutionary satellite-earth station system was developed 18 months ago to allow BBC Micro owners to access the UoSAT1 and UoSAT2 satellites and display their masses of scientific news and data.

"Last year users were able to plot the radiation levels over Chernobyl from satellite transmissions", said Webb. "Astrid is an even better system now, with lots of available software".

Priced £149, Astrid comes with automatic reading, decoding and display software for the BBC Micro and an aerial with eight metres of cable.

Steve Webb . . . active promotion

Database for schools

A PROJECT currently underway at Salford University will eventually provide secondary schools in the Greater Manchester area with their own database.

The work is being carried out under the government's Technical and Vocational Education Initiative which is targeted at students in the 14 to 18 age group and their teachers.

Thirteen local education authorities in the Manchester area are involved in setting up the database, which will be held on a minicomputer at Salford University.

The university is providing facilities and expertise, and Peter Cox from its electrical and electronic engineering department is project manager.

He told *The Micro User*: "The database will provide all kinds of teaching support and material for classroom activities.

"It is being tailored to meet the specific needs of the LEAs it will eventually serve. They are all being given the opportunity to contribute to what is at present a very open ended project.

"Because we are just getting underway we haven't even got a name for the database, but we are confident it will go online in September".

APL version for BBC

HIGH level programming language APL will be available for the BBC Micro this summer, and it could cost as little as £40.

Its BBC conversion, to be called iAPL, is expected to lead to many schools using it as a teaching tool across the curriculum.

The preferred language for internal development at IBM for 20 years, APL was regarded as a mainframe language because it took up so much computer space.

But the emergence of more powerful micros, plus improvements in programming techniques, mean complex languages like APL can now be shoehorned into less memory.

Tony Camacho, spokesman for the international APL user group told *The Micro User*: "Because of these developments we felt it was time for APL, redesigned for a BBC without second processor, to go into schools.

"We managed to raise enough money to employ Paul Chapman, one of only about three people in the world capable of the conversion. He is now threequarters of the way toward an APL interpreter for small machines.

"Paul has already broken the 25k barrier – APL on a mainframe takes up 400k – and we are hoping to get it down to 16k on a single eprom for the BBC.

"Demonstrations of iAPL will take place in Dallas this month and the BBC version should be ready in June or July.

"As it will be produced to full ISO standard, this has a great significance from an educational point of view. We hope it will lead to some of the more go-ahead schools using iAPL to write programs to teach various subjects from mathematics to geography.

"There will be no charge for iAPL software, which we'll contribute to the public domain, and we shall issue the source code.

"We will, however, have to charge people the cost of copying, and for manuals and tutorials, as well as for various educational material we shall be publishing.

"However, I believe we will be able to offer a complete package for schools comprising eprom, manuals – and with permission to copy – for only about £40".

Music pack

AFTER three years developing a software package "good enough for A level music", Electromusic Research has brought out The Scorewriter. It enables music scores to be written on the BBC Micro, with full control over 64 parts on 16 tracks.

The package fully supports standard musical notation and allows scoring in any key or clef. It offers control over transposition, instant transcription of a single piano score from separate parts, and facilities to print out individual lines or a complete orchestral score.

A playback feature monitors the musical accuracy of each part, either through the micro's speaker or via Midi or other external instruments. Price £99.

* * *

AN education service aimed at teachers and parents using the BBC Micro and Master has been launched by Edsoft.

The Edsoft Educational Software Club aims to provide programs that will both stimulate and interest children.

Subscribers receive three programs at bargain prices, six bulletins a year and up to 30 per cent discount on leading educational packages.

EDUCATION NEWS

Neris gets a mixed reception

THE government's new bulletin board-style computerised education service is expected to be fully operational this month.

The National Education Resources Information Service (Neris) opened to mixed reaction.One schools telecoms expert dubbed it "hostile" while other teachers are reported to have dispatched electronic compliments.

Neris director David Taylor explained that the purpose of the service was to bring together information about teaching and learning materials currently scattered around the country. These included materials produced by industry and commerce, the work of teacher groups, and all sorts of learning resources produced by subject organisations and specialist agencies.

No subsciption charges are made as yet because the Department of Trade and Industry has provided initial funding. Users will, however, have to meet the cost of telephone charges at local call rate, and the government expects the service to become self funding before too long.

Neris is a natural extension of the scheme introduced a year ago by the Department of Trade and Industry to provide modems in schools.

More than 12,000 modems have been sent to local authorities, though the take-up level from individual schools is thought to be very patchy.

Those who have them will be able to link their computers to the database computer at the Open University which is linked to the Neris database.

"Neris offers users a variety of search techniques to care for both the inexperienced and the experts", said David Taylor. "Although the information being made available comes from a great many sources it is presented in a common format".

A development team will assess the service to ensure it is meeting teachers' needs.

"Previously", David Taylor went on, "teachers wishing to discover learning resources to meet specific requirements were faced with the task of pursuing their enquiries through an uncoordinated array of individuals, formal agencies and information associations.

"Not only is this job time-consuming, it is hit and miss. Teachers have no way of being sure they are calling on all likely sources of assistance. And even then, some of these sources do not have the machinery for dealing with a regular flow of routine enquiries".

Initially the system will provide information on maths, science, geography, and social and personal development. Other areas will be explored as demand grows.

Good share for Acorn

ACORN scooped a generous share of the Department of Trade and Industry's latest handout to schools.

The last-minute £3.5 million fund for computers and add-ons was only announced on March 9. But half the country's local education authorities placed orders for Acorn products before the March 17 deadline.

They were encouraged by an additional 5 per cent off Acorn's normal educational discounts.

"We were very happy with the response – a good percentage of the DTI spend came our way", Acorn spokesman Michael Page told *The Micro User*.

"There were a lot of orders for Masters and Compacts, but we also sold other equipment like teletext adapters and co-processors".

Schools video project

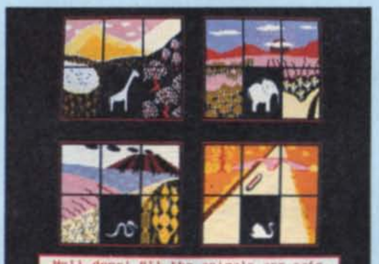
THE Council for Educational Technology's interactive video in schools project is now underway.

Trials of a range of interactive video disc packages will take place at 32 schools, many of which helped produce the material. Further evaluation will be carried out at a number of other schools.

Eight packages covering a broad sweep of the primary and secondary curriculum have been developed by the IVIS project.

They cover languages, mathematics, design, environmental studies, urban development and weather.

The packages run on the BBC Master interactive video system developed for the Domesday project.


Well done! All the animals are safe.

Challenge at the zoo

A PACKAGE for the BBC Micro, Master and Compact which allows children to plan a zoo project is available from 4Mation Educational Resources.

Zoopak challenges children to plan a zoo visit, research animal facts and along the way find a lost child and rescue various animals.

The package contains five programs, activity sheets, zoo information, an illustrated story and software manual. Price £21.

Scheduled timetables

SCHOOL timetabling software producer Keith Johnson has released improved versions of his TT packages for the BBC Micro and Master.

The software, which emulates mainframe programs by actually scheduling timetables instead of merely storing them, has several enhancements. A new command provides more ways of getting a fit, thereby reducing the incidence of kick-out.

The software now lists all the possible combinations of "musical chairs" moves the user can make. In addition, trial runs of timetables can be performed in half an hour or less, enabling several alternatives to be tested before the final version is selected.

Timetable scheduling package TT7, TT8 and TT9 costs £83. Package TT10 and TT11, for printing out individual teacher, class or room timetables and for producing a master timetable, costs £35.

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Temperatures on demand

Product: Measure and Tell
Price: £59.45
Supplier: Clwyd Technics, Unit 4B, Antelope Industrial Estate, Rhydymwyn, Nr Mold, Clwyd CH7 5JH.
Tel: 035283 751

MEASURE and Tell is produced by Clwyd Technics and marketed as the complete courseware package for investigating temperature change and measurement.

The package contains 14 separate items including a wealth of superbly produced and easy-to-follow documentation. There are two thermometers which are sufficiently robust for classroom use and plug into the analogue port at the back of the micro. They have extended leads enabling a variety of uses. An introductory disc allows you to quickly explore the flexibility of the program using simple instructions. The program is operated by the red function keys and their use is explained by a keystrip and a large wallchart.

There is also a disc of sample experiments and a variety of cards, books, record sheets and ideas to help teachers integrate the package into the curriculum.

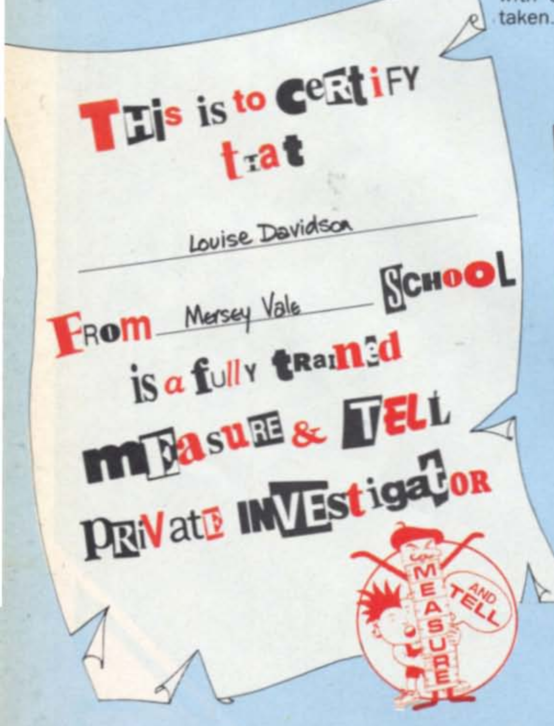
The essence of the package is that your BBC Micro is turned into a sophisticated thermometer allowing you to take temperatures on demand, or by pre-set instructions.

The program will then display the results in six different ways on screen and if required will print them out. You may save your results and compare them with others that you have previously taken.

A default experiment provided on the release disc uses a big number display and encourages children to use their estimation skills to guess temperatures such as the classroom or outside temperature. Their guess can then be compared with the actual micro reading. Other activities encourage investigation work and problem solving. Basic experimentation can be structured to aid reinforcement, prediction and interpretation skills – all good classroom practice.

In turning the micro into a sophisticated thermometer the teacher is then presented with a variety of ways the program can be integrated into the curriculum.

The authors are not short of ideas, and present you with backup material, worksheets, badges and even a cassette featuring the "Battle of Sizzle and Chill" which is followed by music for dance and drama. This complements the story book of the same name and further extends



This is to certify that

Louise Davidson

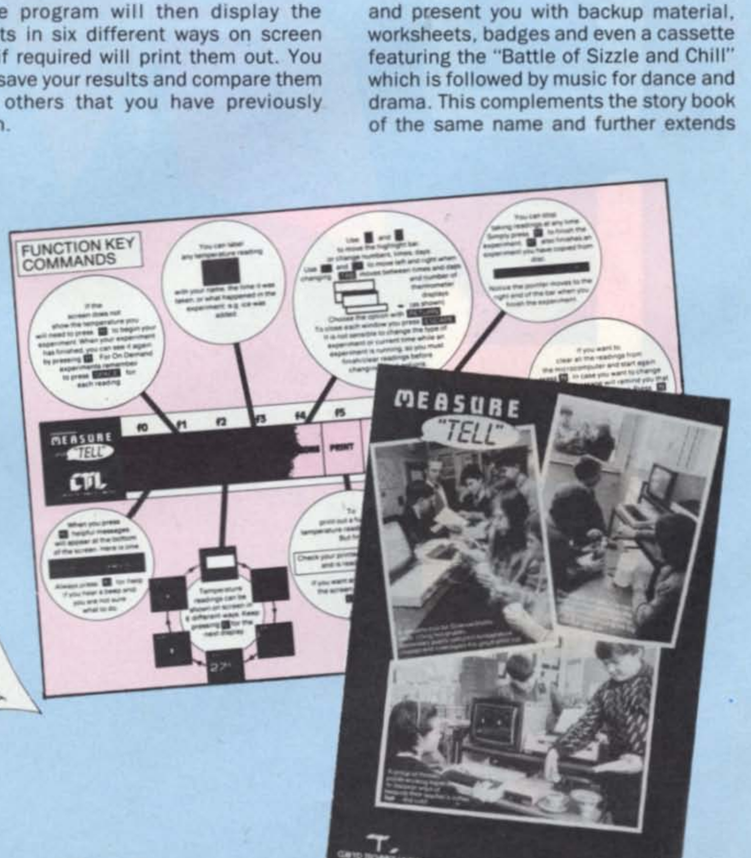
From Mersey Vale School

is a fully trained

Measure & Tell

Private Investigator

MEASURE AND TELL



the theme.

You are given eight activity cards designed for cross-curricular project work and eight handy laminated help cards are provided for classroom use. These remove the need for constant referral to the manual, but if the concise explanation given is not sufficient each card has a page reference back to the manual for detail.

The introduction disc takes you through a simple experiment using two mugs, one with warm water and the other with ice. You place the thermometers into the water and commence the experiment by pressing space. The program is set up to take a reading every two seconds.

When you press f1 the process starts. You place the ice in the water and the subsequent drop in temperature is recorded and stored in the memory of the computer.

The central display area on the monitor indicates each new temperature as taken. At the bottom of the screen there is a control bar and as the experiment progresses it is slowly filled in. When the bar is complete, indicating the end of the experiment, the results may be examined.

Having viewed these (in six different ways) you can then set up a 're-run' of the experiment, and view it at your own pace. You can return the pointer on the control bar back to the start and view the experiment stage by stage, pausing for discussion and analysis as you go. If you then want to keep the experiment you may give it a name and save the results.

The second experiment on this introductory disc allows you to take five readings on demand by pressing space. With this experiment you use just one thermometer, but the program may be set up to use both independently. Using a simple on-screen menu and the cursor keys a variety of options can be explored including one for speech if you have a suitable speech unit fitted.

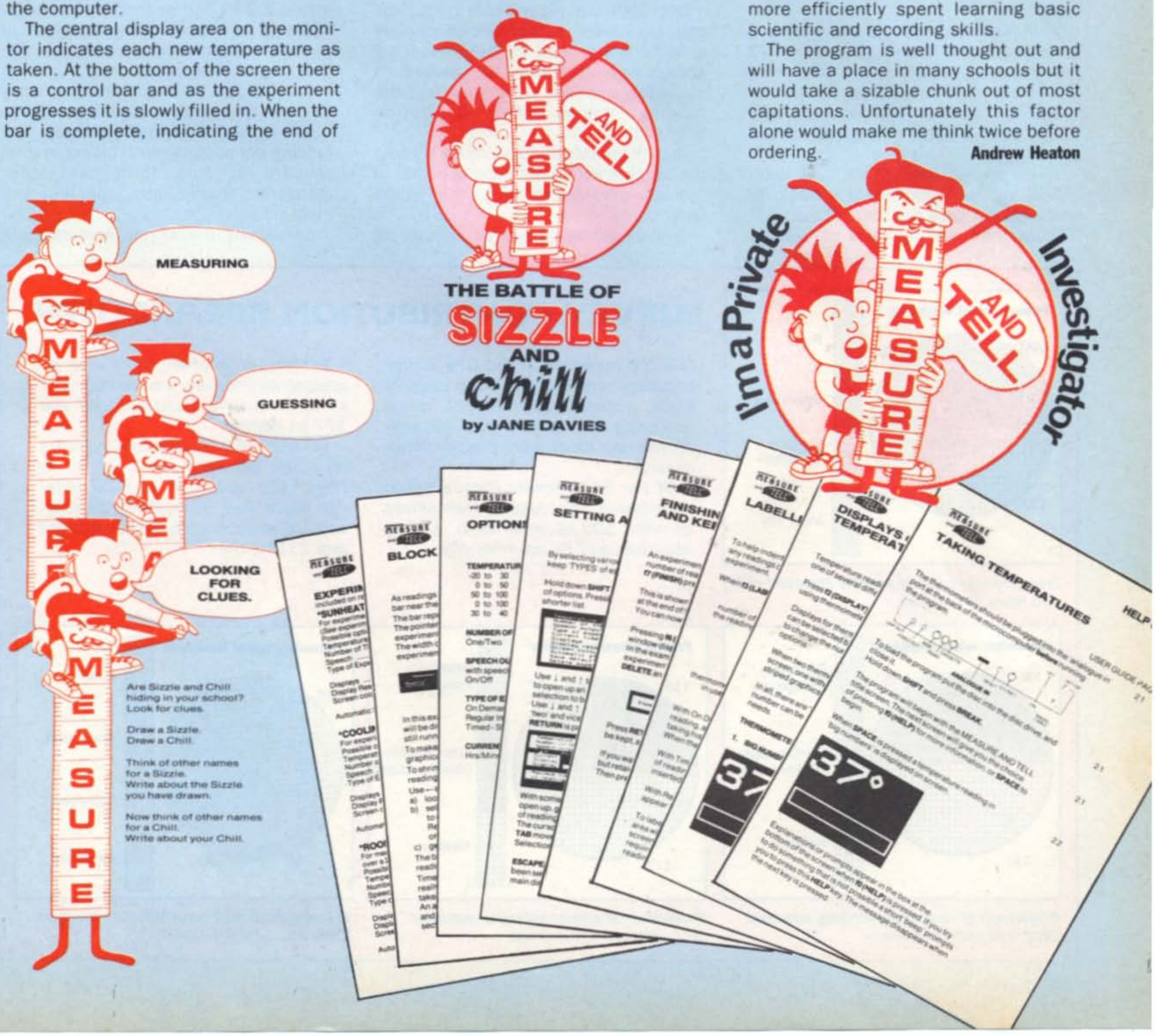
This material gives teachers a considerable resource in the classroom. The idea is simple and the publishers have dug deep to explore every avenue to apply their idea. But why use the micro for this task? It indicates another aspect of the micro's versatility to children and the program stores the results of experimental work.

It does nevertheless perform a lot of tasks that you would hope children should be mastering themselves. The thermometers do nothing a conventional instrument isn't capable of, except recording results automatically over a specified period of time.

Children need to formulate their own ways to record results and analysing them. Many younger children would be unable to interpret what is on the screen and considerable teaching time would need to be spent educating the children about the program. This time could be more efficiently spent learning basic scientific and recording skills.

The program is well thought out and will have a place in many schools but it would take a sizable chunk out of most capitations. Unfortunately this factor alone would make me think twice before ordering.

Andrew Heaton


MEASURE AND TELL
THE BATTLE OF SIZZLE AND chill
by JANE DAVIES
MEASURING
GUESSING
LOOKING FOR CLUES.
MEASURE
Are Sizzle and Chill hiding in your school? Look for clues.
Draw a Sizzle. Draw a Chill.
Think of other names for a Sizzle. Write about the Sizzle you have drawn.
Now think of other names for a Chill. Write about your Chill.
I'm a Private Investigator
BLOCK
OPTION
SETTING A
FINISHIN AND KE
LABELL
DISPLAYS TEMPERAT
TAKING TEMPERATURES
37°

Country cousins get the micros

CHILDREN in rural areas get more opportunity to use computers than their counterparts in towns and cities.

While 60 per cent of primary school heads feel micros make a significant contribution to teaching, less than a quarter of secondary school heads agree.

These are among the main findings of a computing in schools survey carried out by the Department of Education and Science.

The survey was contributed to by 377 primary schools and 263 secondary schools in England, a sample described by the Department as "broadly representative".

It showed that primary schools have an average of 1.7 computers each – 72 per cent of them BBC Micros. This works out at one for every 66 pupils in rural areas compared to one for every 143 pupils in inner areas of large towns and cities.

There are an average of 13.4 computers to each secondary school, of which 60 per cent are BBC Micros.

More than 80 per cent of primary schools have at least one colour monitor, 71 per cent have floppy disc drives and 26 per cent have printers.

Nearly 60 per cent of primary school staff use a micro at least once a week and two-thirds of primary school heads reported that micros make a "significant contribution" to teaching.

In contrast, only 23 per cent of secondary school headteachers consider that micros have made a significant contribution in the classroom.

On average, £1.64 per pupil per year is spent on computing in primary schools, compared to £2.82 in secondary schools.

Over half the expenditure on micros and associated equipment in primary schools is provided by parent-teacher groups and other non-LEA sources. In secondary schools, more than half the funding comes from capitation allowances.

In both primary and secondary schools the average spend per pupil is higher in "socially advantaged" areas than in the inner cities.

Primary schools have an average of four items of computer hardware in addition to the micro itself, compared to 25 items in the average secondary school.

Colour monitors, printers, tape recorders and disc drives top the list, with secondary schools also spending freely on monochrome monitors, modems – the survey was done before the Modems in Schools scheme became effective – turtles, mice, teletext adaptors and Winchester drives.

The most common additional hardware item at secondary level is the colour monitor – 92 per cent of schools have these, an average of seven each. The average secondary school also has six disc drives, four monochrome monitors, three printers and three tape recorders.

Primary schools spend an average £300 each on computing, compared with £2,240 for secondary schools. There is a considerable variation in average expenditure for schools in different catchment areas.

This ranges, in the case of primary schools, from £250 in rural locations to £365 in small towns. However, the funding per pupil is much higher in rural primary schools than the other categories, particularly inner city primary schools.

Conversely, the average amount spent

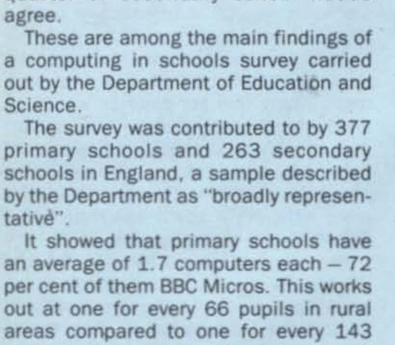
SURVEY CONTRIBUTION BREAKDOWN

FOR the purposes of the DES survey headteachers were asked to classify their school's catchment area according to whether it was relatively prosperous or disadvantaged, urban or rural.

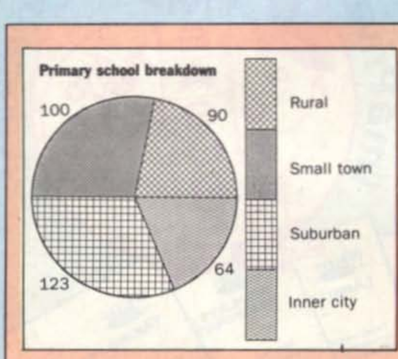
Of the 377 primary schools which contributed 90 classed themselves as rural, 100 as small town, 123 as suburban and 64 as inner city.

In terms of location, there were 87 classed as relatively prosperous, 113 as economically disadvantaged and 177 as neither.

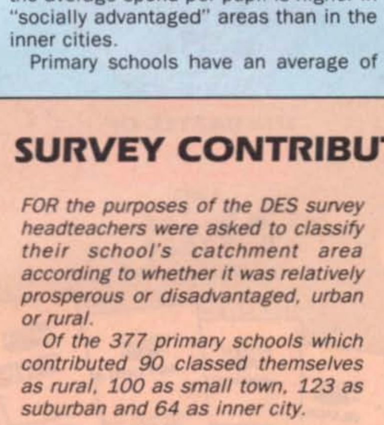
Of the 263 secondary schools reporting 35 were rural, 76 small town, 116 suburban and 36 inner city. There were 56 relatively prosperous, 76 economically disadvantaged and 131 neither.



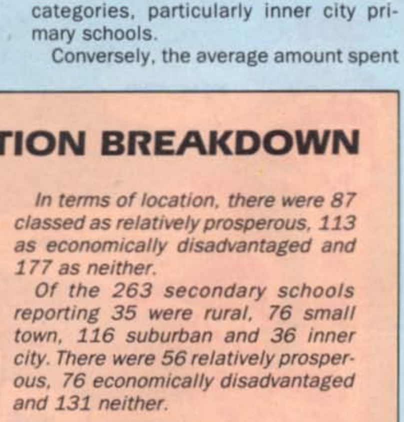
Breakdown of primary schools surveyed (377) into types of location



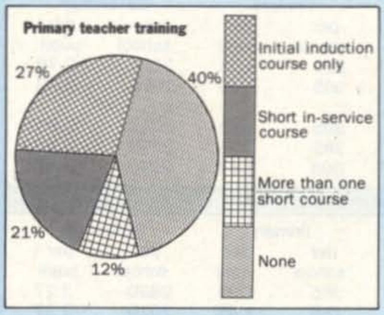
Breakdown of secondary schools surveyed (263) into economic areas



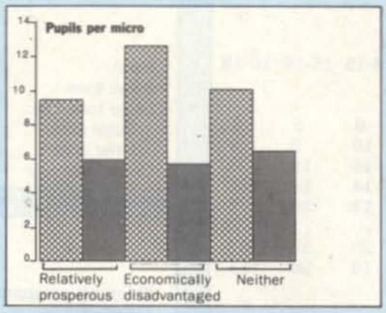
Breakdown of primary schools surveyed (377) into economic areas



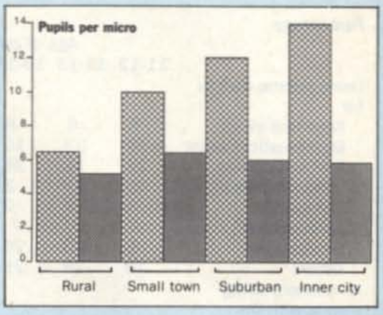
Breakdown of secondary schools surveyed (263) into types of location



Percentage of primary school teachers with micro training



Average number of pupils per micro by economic area



Average number of pupils per micro by geographical area

▨ Primary schools

■ Secondary schools

on secondary school computing – both per pupil and per school – is highest in inner city areas and lowest in small town schools.

Overall the average amount spent per pupil is much higher in relatively prosperous communities than in other areas.

The survey asked schools where they got their software information and where they bought programs. Most common sources for both primary and secondary schools are LEA centres and advisers, hardware manufacturers and magazines.

Headteachers in 57 per cent of primary schools feel that micros have made a substantial contribution to teaching. Nearly 60 per cent of primary school teachers regularly use micros and 42 per cent are involved in training colleagues in their use.

In contrast, only 23 per cent of secondary school headteachers consider that micros make a significant contribution to teaching.

Response to the survey from secondary school heads of departments was low, says the DES, and information about staff training only gave a broad indication of its extent.

But primary schools reported that, on average, 60 per cent of staff have received some form of computer training – though in most cases this has been of a rather basic nature.

In primary schools micros are available for use by pupils during roughly one third of the total teaching hours – older age groups generally being allotted more time with them. Seventy per cent of primary school pupils have hands-on experience of micros.

Younger primary pupils use micros mainly to develop keyboard and mathematical skills, while the emphasis for older children is more toward problem-solving, simulations and databases.

Main subject areas where micros are used in the primary sector are mathematics – 93 per cent of schools – and the learning of language and communication – 92 per cent.

In secondary schools micros are most frequently used in mathematics and

Turn to Page 74 ▶

	Capitation	Other LEA	PTA	Other
Primary				
Rural	0.36	0.59	1.20	0.41
Small town	0.41	0.45	0.66	0.27
Large town/city:				
Outer area	0.42	0.37	0.43	0.21
Inner area	0.25	0.18	0.07	0.07
Overall average	*0.43*	*0.43*	*0.54*	*0.25*
Secondary				
Rural	1.40	0.51	0.59	0.31
Small town	1.17	0.34	0.73	0.19
Large town/city:				
Outer area	2.73	1.00	0.68	0.58
Inner area	1.98	0.84	0.42	0.57
Overall average	*1.49*	*0.51*	*0.54*	*0.28*

Funding of micros by area (amount per pupil £)

	Capitation	Other LEA	PTA	Other
Primary				
Relatively prosperous	0.25	0.43	0.97	0.29
Economically disadvantaged	0.59	0.43	0.26	0.16
Neither	0.37	0.41	0.57	0.28
Overall average	*0.43*	*0.43*	*0.54*	*0.25*
Secondary				
Relatively prosperous	1.57	0.56	0.88	0.26
Economically disadvantaged	1.84	0.57	0.23	0.23
Neither	1.27	0.44	0.54	0.34
Overall average	*1.49*	*0.51*	*0.54*	*0.28*

Funding of micros by social class (amount per pupil £)

	Percentage of pupils with 'hands on' experience	Percentage of teaching hours in which micros are available for use by some pupils
Age group:		
5 year olds	58	24
7 year olds	81	34
9 year olds	75	35
11 year olds	66	32
Overall average	*70*	*32*

Experience and availability of micros in primary schools

Percentages	5 year olds	7 year olds	9 year olds	11 year olds
Percentage of schools using micros mainly for:				
Keyboard skills	36	10	4	2
Mathematical skills	42	48	39	34
Problem solving	9	22	23	26
Word processing	3	6	10	11
Databases	–	–	6	8
Spreadsheet	–	–	–	–
Simulations	–	3	6	11
Others	11	11	12	8
All schools using micros with the age group	100	100	100	100

Micro applications in primary schools

Percentage Using micros mainly for:	Age of pupils 11-12	12-13	13-14	14-15	15-16	16-19
Keyboard skills	5	6	8	9	5	4
Mathematical skills	30	23	10	10	9	8
Problem solving	22	16	28	19	15	8
Word processing	10	13	8	14	16	22
Databases	5	7	2	13	16	7
Spreadsheet	–	–	–	–	1	2
Simulations	9	10	20	20	18	37
Others	19	25	25	16	20	13
All schools using micros with the age group	100	100	100	100	100	100

Micro applications in secondary schools

	Primary per school	 per pupil	Secondary per school	 per pupil
Rural	250	2.55	2170	2.76
Small town	365	1.79	2070	2.43
Large town/city:				
Outer area	305	1.43	2215	2.81
Inner area	285	1.26	2750	3.80
Overall average	*305*	*1.64*	*2240*	*2.82*

Average amount spent on micros by area

	Primary per school	 per pupil	Secondary per school	 per pupil
Relatively prosperous	365	1.94	2890	3.27
Disadvantage	285	1.45	2010	2.87
Neither	290	1.62	2100	2.58
Overall average	*305*	*1.64*	*2240*	*2.82*

Average amount spent on micros by prosperity

◀ ***From Page 73***

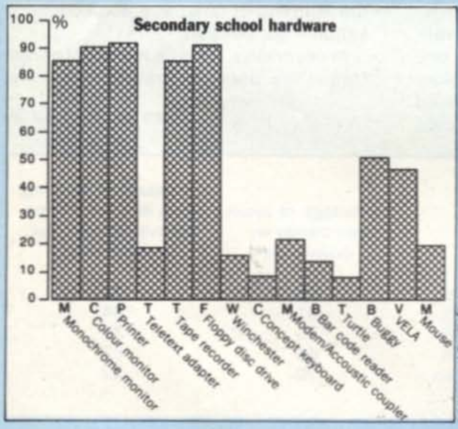
computer studies, two subjects which occasionally overlap. Science departments, geography and craft/design/technology also make significant use of computers according to the survey.

In fact nearly every type of secondary school department appears to make some use of micros – although subjects like sociology, physical education, art and religious studies get a look in at only five percent or less of secondary schools.

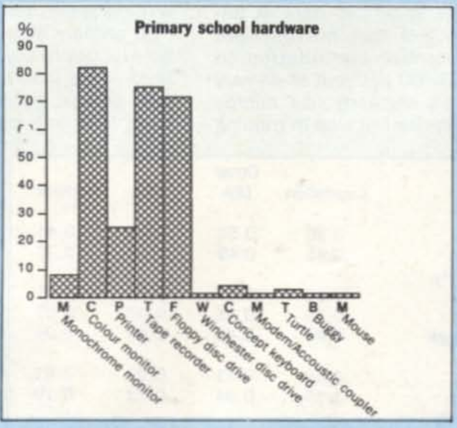
And, surprisingly in view of the amount of supportive equipment and software available, only eight per cent of secondary schools use computers in music teaching.

Among lower age groups in secondary schools micros are mainly used for developing mathematical and problem solving skills. Database simulation and word processing are more frequent uses for older pupils.

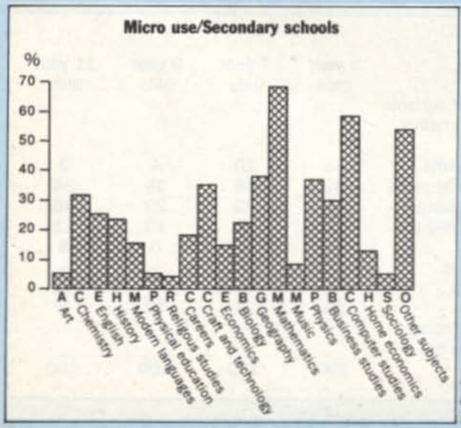
Nearly three-quarters of secondary schools offer examination courses in computer studies and 16 per cent offer examinable courses in microelectronics, according to the survey.



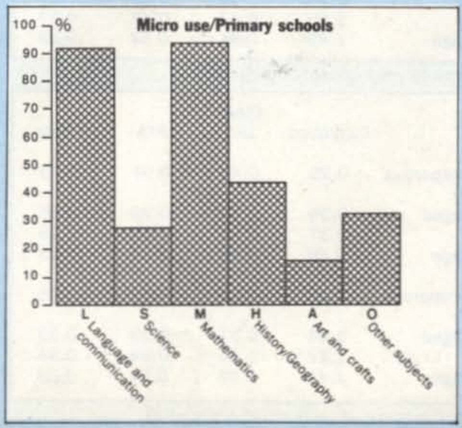
Percentage of secondary schools with additional hardware. The survey was taken before the Modems in Schools scheme.



Percentage of primary schools with additional hardware



Secondary school use of micros in the curriculum



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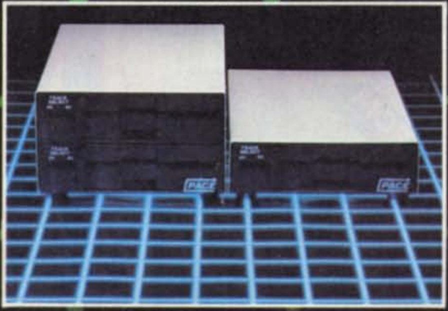

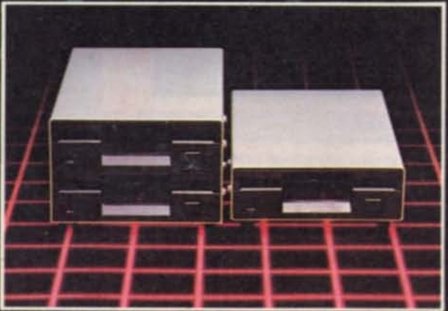

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The mathematical ideas
of coordinates and
random selection
combined by
Tomas Willgoss

PROGRAM

B B+

Sid & The Beetle

A
1
2
3
4
2
3
4
C
D

PROGRAMS for classroom use have to meet some exacting criteria. Apart from the obvious ones of being appropriate to the age of the children and actually containing something that is worth learning, there are the simplicity of the instructions to be read, the time taken to complete the program, and the ease with which the program can be rescued if anything goes wrong.

Teachers are busy people and the last thing they want is a program which involves them in lengthy explanations or does funny things when either the Escape or Break key is pressed.

They are also less than enthusiastic about programs slow to complete, as children like to have their turn and do not respond happily to waiting their turn.

They want their turn, and they want their own program – which brings me to Sid and the Space Bear.

Sid is a simple character who plays games with a mathematical content. The mathematics do not bother either him or the children, not just because they are appropriate to their age, but because there is no tedious necessity for pencil and paper and mistakes are dealt with immediately.

In this program Sid is hiding in a box. But which?

The boxes are arranged in five rows of six. Each row is lettered and each box numbered.

No clues are given, so Sid's hiding place has to be discovered by guessing.

The program imposes an order. The row has to be found first, the correct guess changes the colour of the row, and displays the number.

Then the child works through the numbers, and the correct guess activates the special effects.

The program introduces two mathematical ideas, coordinates and random selection, and has provoked some revealing discussions.

They show that young children think the same answer coming in succession is a mistake, and usually complain, which gives the teacher an opportunity to explain in very simple terms that random selection must always include the possibility of repetition.

Many children discarded random guessing for a systematic approach. Some said it was quicker, which is not true.

Others thought it made remembering the "wrong guesses" easier, and apart from the bright spark who said he could remember millions of numbers in any order, the class thought they made a good point.

They want to play the game again. And that is another criterion. Some commercial software does not meet it.

There are some very good programs for one to run, and I would not reject them. But teachers do need programs which can be repeated for some learning gain.

With Sid, that lies in the discussion and the practice in identifying and locating the keys which have to be pressed.

Most children do not take long to become competent operators. Also one or two quickly become hovering critics and tell the teachers what to do.

The second program, Beetle, takes the ideas a stage further.

This time Sid has put his beetle in a box and cannot find it. Myrtle, his friend, offers to help by giving clues...

Now the boxes are arranged in four rows – A to D – of eight (1 to 8). The children guess the row and then the number.

If the box is empty, Myrtle eliminates all the boxes in the wrong row and with the wrong number, reinforcing the row-column idea of cooordinates.

This continues until the correct box is discovered, and the beetle appears in it.

Sid walks on, the beetle joins him and they walk off together.

Myrtle then appears to say thank you – but after an interval an alarm sounds.

Sid has lost his beetle again and it's back to square one!

Turn to Page 78 ▶

SID LISTING

◀ From Page 77

```
   10 REM SID
   20 REM (c) The Micro User
   30 CLS
   40 PRINTTAB(4,4);"This is a simple ga
me"
   50 PRINTTAB(4,6);"introducing two co-
ordinates"
   60 PRINTTAB(4,10);"You can control th
e"
   70 PRINTTAB(4,12);"number of turns ea
ch"
   80 PRINTTAB(4,14);"child has."
   90 PRINTTAB(4,18);"How many turns";:I
NPUTgo
  100 VDU 23,240,153,189,255,90,126,102,
60,60
  110 VDU 23,241,255,189,60,60,36,36,102
,0
  120 VDU 23,242,255,129,129,129,129,129
,129,129
  130 VDU 23,243,129,129,129,129,129,129
,255,0
  140 MODE 2
  150 VDU 23,1,0;0;0;0;:*FX11,0
  160 COLOUR 7:COLOUR 132:CLS
  170 PRINTTAB(9,4);CHR$(240)
  180 PRINTTAB(9,5);CHR$(241)
  190 PRINTTAB(7,7);"HELLO!"
  200 PRINTTAB(4,9);"I am Sid the"
  210 PRINTTAB(5,11);"Space Bear."
  220 COLOUR 3
  230 PRINTTAB(3,13);"I like hiding"
  240 PRINTTAB(5,15);"in a box!"
  250 PRINTTAB(9,17);CHR$(242)
  260 PRINTTAB(9,18);CHR$(243)
  270 COLOUR 7
  280 PRINTTAB(2,20);"Can you find me?"
  290 PRINTTAB(2,22);"Press Space bar."
  300 key=GET
  310 IF key<>32 THEN 300
  320 CLS
  330 REPEAT
  340 H=5:V=4:alph=65
  350 FOR row=1 TO 5
  360 COLOUR 7
  370 PRINTTAB(2,V+1);CHR$(alph)
  380 FOR box=1 TO 6
  390 COLOUR 3
  400 PRINTTAB(H,V);CHR$(242)
  410 PRINTTAB(H,V+1);CHR$(243)
  420 H=H+2:NEXTbox
  430 alph=alph+1:H=5:V=V+3
  440 NEXTrow
  450 R=RND(5)+64:B=RND(6)
  460 COLOUR 7
  470 SOUND 1,-15,100,4
  480 PRINTTAB(0,20);"In which row am I"
;:INPUTR$
  490 IF ASC(R$)=R THEN 550
  500 PRINTTAB(2,22);"Wrong!Try again."
  510 FOR D=1 TO 2500:NEXTD
  520 PRINTTAB(0,20);SPC(23)
  530 PRINTTAB(1,22);SPC(18)
  540 IF ASC(R$)<>R THEN 470
  550 PRINTTAB(1,22);"Correct!":VDU 7
  560 FOR D=1 TO 2500:NEXTD
  570 PRINTTAB(0,20);SPC(23)
  580 PRINTTAB(1,22);SPC(16)
  590 COLOUR 1
  600 V=(R-65)*3+4:H=5
  610 FOR boxred=1 TO 6
  620 PRINTTAB(H,V);CHR$(242)
  630 PRINTTAB(H,V+1);CHR$(243)
  640 H=H+2:NEXTboxred
  650 H=5
  660 FOR numb=1 TO 6
  670 PRINTTAB(H,2);numb
  680 VDU 7:FOR D=1 TO 600:NEXTD
  690 H=H+2
  700 NEXTnumb
  710 FOR D=1 TO 1000:NEXTD
  720 COLOUR 7
  730 SOUND 1,-15,100,4
  740 PRINTTAB(0,20);"In which box am I"
;:INPUTG
  750 IF G=B THEN 810
  760 PRINTTAB(2,22);"Wrong!Try again."
  770 FOR D=1 TO 2000:NEXTD
  780 PRINTTAB(0,20);SPC(24)
  790 PRINTTAB(1,22);SPC(16)
  800 IF G<>B THEN 730
  810 PRINTTAB(2,22);"CORRECT!"
  820 SOUND 1,-15,120,6
  830 SOUND 1,-15,128,8
  840 COLOUR 9
  850 PRINTTAB(5+((B-1)*2),V);CHR$(242)
  860 PRINTTAB(5+((B-1)*2),V+1)CHR$(243)
  870 FOR D=1 TO 5000:NEXTD
  880 COLOUR 7
  890 PRINTTAB(1,25)"You have found me!"
  900 FOR tune=1 TO 4
  910 SOUND 1,-15,93,12
  920 SOUND 1,-15,109,12
  930 SOUND 1,-15,121,18
  940 PRINTTAB(5+((B-1)*2),V);CHR$(240)
  950 PRINTTAB(5+((B-1)*2),V+1)CHR$(241)
  960 NEXTtune
  970 COLOUR 2
  980 PRINTTAB(2,28);"Press Space Bar"
  990 keyhit=GET
 1000 IF keyhit<>32 THEN 990
 1010 turn=turn+1
 1020 CLS
 1030 UNTIL turn=go
 1040 PRINTTAB(4,5);"Next,please."
 1050 FOR D=1 TO 5000:VDU 7
 1060 PRINTTAB(2,8);"Press Space bar"
 1070 key=GET
 1080 IF key<>32 THEN 1070 ELSE 140
```

BEATLE LISTING

```
   10 REM BEETLE
   20 REM (c) The Micro User
   30 MODE 2
   40 VDU 23,1;0;0;0;0;:*FX 11,0
   50 RESTORE 1850
   60 VDU 23,240,153,189,255,90,126,102,
60,60
   70 VDU 23,241,255,189,60,60,36,36,102
,0
   80 VDU 23,242,255,129,129,129,129,129
,129,129
   90 VDU 23,243,129,129,129,129,129,129
,255,0
  100 VDU 23,244,34,54,127,107,62,20,28,
127
  110 VDU 23,245,93,93,28,20,20,85,119,0
  120 VDU 23,246,255,255,255,255,255,255
,255,255
  130 VDU 23,247,255,255,255,255,255,255
,255,0
  140 VDU 23,248,255,129,129,165,153,153
,189,189
  150 VDU 23,249,189,189,153,165,165,129
,255,0
  160 VDU 23,250,0,0,0,0,0,36,24,24
  170 VDU 23,251,126,60,60,126,24,36,36,
0
```

This is one of hundreds of programs now available FREE for downloading on MicroLink

```
  180 VDU 23,252,255,255,255,255,255,189
,219,231
  190 VDU 23,253,231,219,189,255,255,255
,255,0
  200 PRINTTAB(3,9)"Press Space bar"
  210 PRINTTAB(5,11)"when ready!"
  220 keyhit=GET
  230 IF keyhit<>32 THEN 220
  240 SOUND 2,-15,80,7
  250 SOUND 2,-15,98,4
  260 COLOUR 7:COLOUR 132:CLS
  270 RESTORE 1850
  280 sidh=5:sidv=4
  290 FOR sid=1 TO 5
  300 READ A$
  310 PRINTTAB(sidh,sidv);CHR$(32);CHR$(
240)
  320 PRINTTAB(sidh,sidv+1);A$;CHR$(241)
  330 FOR delay=1 TO 200:NEXTdelay
  340 sidh=sidh+1:NEXTsid
  350 PRINTTAB(2,8);"Please help me!"
  360 PRINTTAB(2,10);"I have lost my"
  370 PRINTTAB(3,12);"   beetle."
  380 PRINTTAB(1,15);"I put it in a box"
  390 PRINTTAB(1,17);"and I cannot find"
  400 PRINTTAB(8,19);"it!"
  410 COLOUR 2
  420 PRINTTAB(2,23);"Press Space bar"
  430 keyhit=GET
  440 IF keyhit<>32 THEN 430
  450 COLOUR 4:COLOUR 134:CLS
  460 myrth=6:myrtv=4
  470 FOR myrt=1 TO 6
  480 READ B$
  490 PRINTTAB(myrth,myrtv);CHR$(32);CHR
$(244)
  500 PRINTTAB(myrth,myrtv+1);B$;CHR$(24
5)
  510 SOUND 1,-12,108,1
  520 SOUND 1,-15,120,1
  530 FOR delay=1 TO 350:NEXTdelay
  540 myrth=myrth+1:NEXTmyrt
  550 PRINTTAB(4,8);"I am Myrtle."
  560 PRINTTAB(2,10);"I know where the"
  570 PRINTTAB(3,12);"  beetle is!"
  580 PRINTTAB(2,15);"I will not tell"
  590 PRINTTAB(2,17);"      Sid."
  600 PRINTTAB(2,20);"But I will help"
  610 PRINTTAB(3,22);" you find it."
  620 COLOUR 1
  630 PRINTTAB(2,25);"Press Space bar"
  640 keyhit=GET
  650 IF keyhit<>32 THEN 640
  660 COLOUR 3:COLOUR 132:CLS
  670 H=3:V=3
  680 FOR row=1 TO 4
  690 COLOUR 2:PRINTTAB(1,V+1);CHR$(row+
64):COLOUR 3
  700 FOR box=1 TO 8
  710 PRINTTAB(H,V);CHR$(246)
  720 PRINTTAB(H,V+1);CHR$(247)
  730 H=H+2:NEXTbox
  740 H=3:V=V+3
  750 NEXTrow
  760 COLOUR 7
  770 H=3
  780 FOR num=1 TO 8
  790 PRINTTAB(H,1);num
  800 H=H+2:NEXTnum
  810 hbox=RND(8):alphrow=RND(4)+64
  820 PRINTTAB(1,16);"Which row";:COLOUR
 2:INPUTgr$:COLOUR 7
  830 IF ASC(gr$)<65 OR ASC(gr$)>68 THEN
 PRINTTAB(1,18);"Bad answer!":FOR delay=
1 TO 2500:NEXTdelay:PRINTTAB(1,16)SPC(16
):PRINTTAB(1,18)SPC(11):GOTO 820
  840 PRINTTAB(1,18);"Which number";:INP
UTgnum
  850 IF gnum<1 OR gnum>8 THEN PRINTTAB(
1,20);"Bad answer!":FOR delay=1 TO 2500:
NEXTdelay:PRINTTAB(1,18)SPC(17):PRINTTAB
(1,20)SPC(11):GOTO 840
  860 gr=ASC(gr$)-64
  870 IF gr=alphrow-64 AND gnum=hbox THE
N1140
  880 H=3:V=3
  890 COLOUR 11:SOUND 3,-15,48,6
  900 PRINTTAB(H+((gnum-1)*2),V+((gr-1)*
3));CHR$(242)
  910 PRINTTAB(H+((gnum-1)*2),V+1+((gr-1
)*3));CHR$(243)
  920 COLOUR 7
  930 PRINTTAB(1,21)"That box is empty."
  940 FOR delay=1 TO 4000:NEXTdelay
  950 COLOUR 3
  960 PRINTTAB(1,21)"Myrtle says-        "
  970 IF gr<>alphrow-64 AND gnum<>hbox T
HEN PRINTTAB(1,23);"Wrong row!":FOR wbox
=1 TO 8:PRINTTAB(H,V+((gr-1)*3));CHR$(25
2):PRINTTAB(H,V+1+((gr-1)*3));CHR$(253):
H=H+2:NEXTwbox
  980 IF gr=alphrow-64 THEN PRINTTAB(1,2
3);"Right row!"
  990 IF gr=alphrow-64 AND gnum<>hbox TH
EN PRINTTAB(H+((gnum-1)*2),V+((gr-1)*3))
;CHR$(252):PRINTTAB(H+((gnum-1)*2),V+1+(
(gr-1)*3));CHR$(253):PRINTTAB(1,25);"Wro
ng number!"
 1000 H=3:V=3
 1010 IF gnum<>hbox AND gr<>alphrow-64 T
HEN PRINTTAB(1,25);"Wrong number!":FOR w
col=1 TO 4:PRINTTAB(H+((gnum-1)*2),V);CH
R$(252):PRINTTAB(H+((gnum-1)*2),V+1);CHR
$(253):V=V+3:NEXTwcol
 1020 IF gnum=hbox THEN PRINTTAB(1,25);"
Right number!"
 1030 V=3
 1040 IF gnum=hbox AND gr<>alphrow-64 TH
EN PRINTTAB(H+((gnum-1)*2),V+((gr-1)*3))
;CHR$(252):PRINTTAB(H+((gnum-1)*2),V+1+(
(gr-1)*3));CHR$(253):PRINTTAB(1,23);"Wro
ng row!"
 1050 COLOUR 2
 1060 PRINTTAB(3,28);"Press Space bar"
 1070 keyhit=GET
 1080 IF keyhit<>32 THEN 1070
 1090 H=1:V=15
 1100 FOR del=1 TO 14
 1110 PRINTTAB(H,V)SPC(18)
 1120 V=V+1:NEXTdel
 1130 COLOUR 7:GOTO 820
 1140 COLOUR 7
 1150 H=3:V=3
 1160 PRINTTAB(H+((gnum-1)*2),V+((gr-1)*
3));CHR$(248)
 1170 PRINTTAB(H+((gnum-1)*2),V+1+((gr-1
)*3));CHR$(249)
 1180 PRINTTAB(6,21);"Hooray!"
 1190 SOUND 1,-15,128,3
 1200 SOUND 1,-15,142,2
 1210 PRINTTAB(1,23);"You have found my"
 1220 PRINTTAB(6,25);"beetle"
 1230 H=0:FOR delay=1 TO 4500:NEXTdelay
 1240 FOR walkon=1 TO 3+((gnum-1)*2)
 1250 PRINTTAB(H,27);CHR$(32);CHR$(240)
 1260 PRINTTAB(H,28);CHR$(32);CHR$(241)
 1270 SOUND 1,-15,102,1
 1280 SOUND 1,-15,110,1
 1290 FOR delay=1 TO 300:NEXTdelay
 1300 H=H+1:NEXTwalkon
 1310 H=1:V=16
 1320 FOR del=1 TO 11
 1330 PRINTTAB(H,V)SPC(18)
 1340 V=V+1:NEXTdel
 1350 H=2:V=3
 1360 PRINTTAB(H+((gnum-1)*2),V+((gr-1)*
3));CHR$(250);CHR$(242)
 1370 PRINTTAB(H+((gnum-1)*2),V+1+((gr-1
)*3));CHR$(251);CHR$(243)
 1380 FOR bedown=V+((gr-1)*3) TO 26
 1390 PRINTTAB(H+((gnum-1)*2),V+((gr-1)*
3));CHR$(32)
 1400 PRINTTAB(H+((gnum-1)*2),V+1+((gr-1
)*3));CHR$(250)
 1410 PRINTTAB(H+((gnum-1)*2),V+2+((gr-1
)*3));CHR$(251)
 1420 SOUND 1,-12,150,2
 1430 FOR delay=1 TO 250:NEXTdelay
 1440 V=V+1
 1450 NEXTbedown
 1460 FOR delay=1 TO 300:NEXTdelay
 1470 FOR walkoff=H+((gnum-1)*2) TO 17
 1480 PRINTTAB(H+((gnum-1)*2),V+((gr-1)*
3));CHR$(32);CHR$(250);CHR$(240)
 1490 PRINTTAB(H+((gnum-1)*2),V+1+((gr-1
)*3));CHR$(32);CHR$(251);CHR$(241)
 1500 SOUND 1,-15,102,1
 1510 SOUND 1,-15,110,1
 1520 FOR delay=1 TO 250:NEXTdelay
 1530 H=H+1:NEXTwalkoff
 1540 FOR delay=1 TO 250:NEXTdelay
 1550 PRINTTAB(H+((gnum-1)*2),V+((gr-1)*
3));CHR$(32);CHR$(32)
 1560 PRINTTAB(H+((gnum-1)*2),V+1+((gr-1
)*3));CHR$(32);CHR$(32)
 1570 FOR delay=1 TO 1500:NEXTdelay
 1580 COLOUR 4:COLOUR 134:CLS
 1590 myrth=4:myrthv=6
 1600 FOR myrt=1 TO 10
 1610 READ C$
 1620 PRINTTAB(myrth,myrtv);CHR$(32);CHR
$(244)
 1630 PRINTTAB(myrth,myrtv+1);C$;CHR$(24
5)
 1640 SOUND 1,-12,108,1
 1650 SOUND 1,-15,120,1
 1660 FOR delay=1 TO 350:NEXTdelay
 1670 myrth=myrth+1:NEXTmyrt
 1680 PRINTTAB(1,9);"You have found his"
 1690 PRINTTAB(1,11);"     beetle."
 1700 PRINTTAB(1,13)"Sid is very happy!"
 1710 PRINTTAB(1,15);"    Good-bye!"
 1720 FOR delay=1 TO 6000:NEXTdelay
 1730 FOR alarm=1 TO 10
 1740 SOUND 2,-15,80,7
 1750 SOUND 2,-15,98,4
 1760 NEXTalarm
 1770 COLOUR 1
 1780 PRINTTAB(6,18);"Oh dear!"
 1790 PRINTTAB(5,20);"Silly Sid!"
 1800 PRINTTAB(3,22);"He has done it"
 1810 PRINTTAB(7,24);"again!"
 1820 PRINTTAB(3,27);"Press Space bar"
 1830 keyhit=GET
 1840 IF keyhit<>32 THEN 1820 ELSE 260
 1850 DATA H,E,L,P,!
 1860 DATA H,E,L,L,O,!
 1870 DATA T,H,A,N,K,-,Y,O,U,!
```

This listing is included in this month's tape & disc offer. See order form on Page 167.

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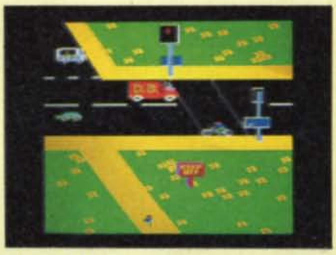
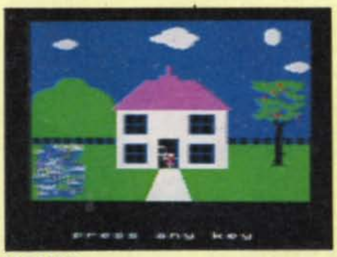
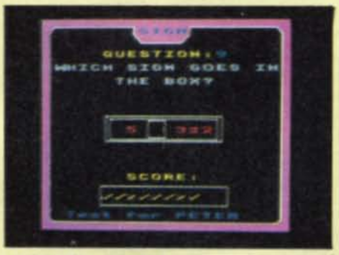
Pelmanism
Towers of Hanoi



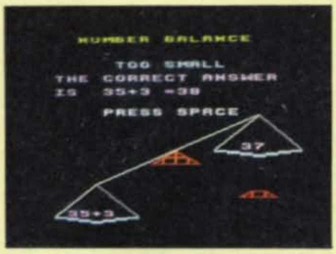
PELICAN
Teach your children to cross the road safely at a Pelican crossing


press any key

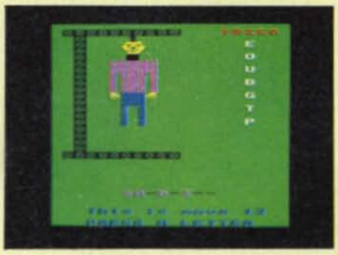
HOUSE
Select the colours to draw a house – hours of creative entertainment


SIGN
QUESTION:
WHICH SIGN GOES IN THE BOX?
5
SCORE:
Test for PETER

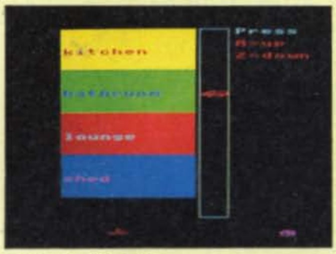
NUMBER SIGNS
Provide the correct arithmetic sign and aim to score ten out of ten


NUMBER BALANCE
TOO SMALL
THE CORRECT ANSWER IS 35+3 =38
PRESS SPACE
37
35+3

BALANCE
Learn maths the fun way. Type in the answer to balance the scales



HANGMAN
Improve your child's spelling with this fun version of the popular game


Press
kitchen
bathroom
lounge
shed

ODD MAN OUT
Find the word that does not fit – before your time runs out

TO ORDER TURN TO THE FORM ON PAGE 167

EDUCATION LETTERS

Keep your letters coming in – the education pages are here to reflect your interests. We want to hear your tips, ideas, experiences and suggestions. Send your contributions to:
Peter Davidson, Education Editor, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport, SK7 5NY.

Signs of trouble

I HAVE a BBC Model B and have recently upgraded my Mini Office to Instant Mini Office II.

I use the word processor for preparing worksheets for my class of junior school children. However, with the new board fitted I can no longer print a £ sign when in double height mode or an @ sign in any mode.

Is there any way to overcome this problem, apart from removing the Instant Mini Office board (which I would not be happy to do for fear of damage to the pins), since Mini Office I will not run with the board in place. – **Mrs H.S.Smith, Winslow, Buckingham.**

● Mini Office II has an embedded command that allows you to define which character is to be used as £. If you put the command DP96 at the start of your text, it should be printed.

The @ symbol is used as the page number, so it will print as 1 on page one, 2 on page two and so on.

If you want to use @ in your text, just choose another unused symbol as a page number and use the embedded command NC to change over.

For example, after the command NC#, @ will print as itself and # will print the page number.

Vanishing text

PLEASE can you tell me where I can find out more about the ribbon deal mentioned in the October 1986 issue of The Micro User.

I have had to use Wordwise+ on a B+ instead of View 3 on a Master 128 for this letter, as the paragraph format key (f0) on the latter is causing the erasure of my text. Can someone possibly offer an explanation and solution, please?

Is there any chance of obtaining a copy of the tape or disc, to go with go with the Education Special 2 *magazine that I have?* – **Miss M.R. Darby, Wookey, Somerset.**

● Aladdink's address is 4 Hurkum Crescent, Eyemouth, Berwickshire, Scotland.

We can see no reason why you should lose text in View by pressing f0, unless you are accidentally pressing the Control key as well. Can any of our readers suggest a more likely possibility?

Education Special 2 tapes and discs are available with the magazine as a special offer. Details can be obtained by ringing 061-480 0171.

The case for Logo

ACCORDING to Philip Andrews in The Micro User, *March 1987 "Sales of the various Logo chips have been very disappointing, underlining the lack of faith most (teachers) have in Logo".*

I have no idea where he gets his information, but Logotron Logo roms have been installed in more than 15,000 BBC Micros in Australian and British schools, and sales today are running as strongly as they were two years ago when the product was first launched.

The disc version of the software is bundled with the Compact, so it is now enjoying even wider distribution.

Worse still, Philip Andrews disputes claims about the educational values of Logo. He should read Beverly Anderson's book, Learning with Logo, or talk to Professor Celia Hoyles and her colleagues at the Institute of Education, London University.

He should also take note of how many Logo enthusiasts have been appointed to senior posts at the government's Microelectronics Education Support Unit.

Finally, if teachers really are short of ideas for using Logo, they should pick up a wonderful book by Richard Noss and Mike Thorne, Microworlds – Adventures with Logo, published by Hutchinsons. – **Christopher Roper, Technical Director, Logotron, Cambridge.**

Solving surds

HERE is a program that solves surds. The program will print the surd with the highest number under the root sign, followed by the surd with the highest number outside the root sign. – **J.Roper, Aged 14, Meopham, Kent.**

Belfast database

I AM currently teaching computer studies in a local secondary school in Northern Ireland.

I noted your article in the Education News section in the March 1987 issue about the viewdatabase of Swadelands,

Turn to Page 82 ▶

```
   10 REM Surd Solver
   20 REM by J. Roper
   30 REM (c) Micro User
   80 ON ERROR IF ERR=20 PR
INT"Number too big for prog
ram.":A=INKEY(100):RUN ELSE
 REPORT:PRINT" at line "ERL
:END
   90 *FX18
  100 *FX12,3
  110 *FX144,255,1
  120 MODE4
  130 VDU23,224,3,4,4,8,8,1
44,80,32
  140 VDU23,255,0,0,96,152,
6,0,0,0
  150 VDU23;8202;0;0;0;
  160 PRINT"Type in the sur
d eg. 2";CHR$224;"10"
  170 PRINT'"Press f0 for "
CHR$224;" sign"
  180 PRINT'STRING$(40,CHR$
225)
  190 *KEY0 !@
  200 INPUT'"Enter surd : "
surd$
  210 PRINT'STRING$(40,CHR$
225)
  220 position-of-root-sign
=INSTR(surd$,CHR$128)
  230 number-before-root-si
gn=VAL(MID$(surd$,position-
of-root-sign-1))
  240 IFposition-of-root-si
gn=1 THEN number-before-roo
t-sign=1
  250 second-number-after-r
oot-sign=VAL(MID$(surd$,pos
ition-of-root-sign+1,LEN(su
rd$)))
  260 PRINT'"The surd all u
nder one "CHR$224" sign :"
  270 PRINT'STRING$(40,CHR$
225)
  280 number-under-root-sig
n=number-before-root-sign↑2
*second-number-after-root-s
ign
  290 PRINT'CHR$224;number-
under-root-sign'
  300 lowest-number-under-r
oot=number-under-root-sign
  310 IFINT(SQR(lowest-numb
er-under-root))=SQR(lowest-
number-under-root) GOTO490
  320 counter=2
  330 REPEAT
  340 square=counter↑2
  350 IFsquare>=number-unde
r-root-sign GOTO400
  360 remainder=number-unde
r-root-sign MOD square
  370 square-minus-remainde
r=number-under-root-sign DI
V square
  380 IFremainder=0 AND squ
are-minus-remainder<=lowest
-number-under-root THEN low
est-number-under-root=squar
e-minus-remainder
  390 counter=counter+1
  400 UNTIL square<=number-
under-root-sign
  410 multiple-of-root=SQR(
number-under-root-sign/lowe
st-number-under-root)
  420 PRINT'"Lowest number
 under root : "
  430 PRINT'multiple-of-roo
t;CHR$128;lowest-number-und
er-root
  440 PRINTSTRING$(40,CHR$2
25)
  450 PRINT''"Press any ke
y......."
  460 *FX21,0
  470 key=GET
  480 RUN
  490  PRINT'"Most simple a
nswer = ";INT(SQR(lowest-nu
mber-under-root))
  500 PRINTSTRING$(40,CHR$2
25)
  510 PRINT''"Press any ke
y......."
  520 *FX21,0
  530 key=GET
  540 RUN
```

EDUCATION LETTERS

◀ **From Page 81**

Kent and thought your readers may be interested in ours, Deramore Viewdata.

It has been online since September 1 1986 and contains information initially intended for teachers in Northern Ireland who wish to access such a database at local call rates, but we would be glad to receive calls from any other teachers.

There are more than 1000 pages on many topics including INSET courses, reviews of software (serious and games), telesoftware (including Econet compatible section), a multipath adventure game written solely by the pupils of the school, and health information (including AIDS details recently issued by the government).

We also have curriculum development information provided by NICED (Northern Ireland Council for Educational Development). The more important areas can be accessed using keyword searching.

The database is on Belfast (0232) 641514 running at 1200/75 baud (Communitel host) and runs 24 hours a day.

Finally could I add that we would welcome any contributions from teachers and these may be sent using the mail facility, or on disc as an Ascii file. – **D.P. Barr, Network Manager, Deramore High School, Belfast.**

Retrieval procedure

I HAVE not written to you before during the last three years as all the programs I have typed from your listings have worked.

However, Flying Fingers in the January issue of The Micro User *has for some unaccountable reason crashed. Disappointingly so, as I saw it as a good basic typing tutor for my daughter.*

My normal method, which I used here, is to type the listing, save the program, then run it from the typed listing using the copy on cassette as a back-up.

The program crashed and the cassette only loads up to block 14. Yet having saved it as it was typed, I had previously saved beyond 14.

It seems a pity to have lost a useful education tool after two days typing, so is there any way to recover my work? – **R. Bryan, Fareham, Hants.**

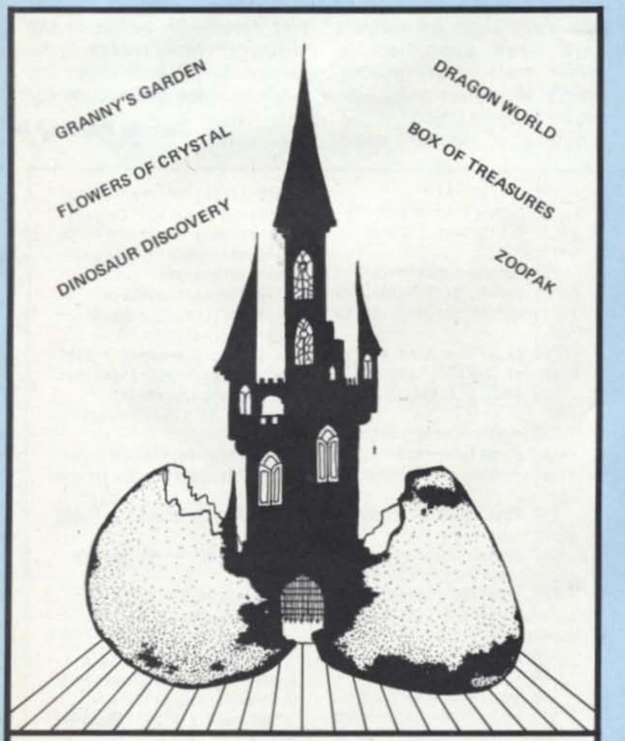
● First some advice for the future. You should always make at least two copies of a program, and never save over an old copy until you are sure you have a good, updated copy.

But we're too late with that advice, so what should you do?

Obviously you sensibly saved the program before running it, as programs with machine code in them can crash due to even the small est typing error.

All that is wrong with your tape is that there is a fault in block 14, so you can recover most, but not all your program.

Before loading it type *OPT2,0. This allows the whole program to load without stopping at block 14. You will probably find that you get a Bad Program message when loading is complete, so type !TOP=&FF0D then LIST and you should then have most of your program back.



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For full specification see page 5

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Details on Technomatic Winchesters on page 6

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EPSON LQ800 See details on page 5.	£439 (a)
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Full details on page 6.
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Full specification on page 6.

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MITSUBISHI XC1404 14″ Med Res RGB Monitor Etched dark screen brilliance and contrast control, BBC/IBM compatible	**£219 (a)**

12″ MONOCHROME MONITORS

TAXAN KX1201G Hi Res green etched screen	**£85 (a)**
TAXAN KX1202G Hi Res Long Persistence (P39)	**£95 (a)**
TAXAN KX1203A Hi Res amber etched screen	**£95 (a)**
PHILIPS BM 7502 Hi Res green screen	**£75 (a)**
PHILIPS BM7522 Hi Res amber screen	**£75 (a)**

MONITOR ACCESSORIES

Microvitec Swivel Base (14″ plastic monitors)	**£20 (c)**
Philips Swivel Base	**£14 (c)**
Monitor Stand Models B & B +	**£10 (c)**
Monitor Stand Master	**£13 (c)**
Double Tier stand Models B, B + or Master	**£24 (b)**
Taxan RGB Lead	**£5 (d)**
Microvitec Lead	**£3.50 (d)**
Monochrome BNC/Phono Lead	**£3.50 (d)**

EPROMS/RAMS

2764-25	**£2.50 (d)**
27128-25	**£2.75 (d)**
6264LP-15	**£2.80 (d)**

RAM/ROM EXPANSION

ATPL Board for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms + 2 8K Rams	**£37 (c)**
ATPL Battery backup kit	**£16 (d)**
ATPL Board for BBC+ (now in stock).	**£31 (c)**
TIME WARP Real Time Clock. Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program	**£31 (d)**
Time Warp with PANOS Utilities.	**£39 (d)**

MODEMS

(All modems are BABT approved)
See page 7 for modem specifications

MIRACLE WS2000V21/23 & BELL stds	**£95 (c)**
WS2000 Auto Dial Card	**£27 (d)**
WS2000 Auto Answer Card	**£27 (d)**
WS2000 SK1 Kit	**£5 (d)**
WS2000 DS1 disc	**£10 (d)**
WS2000 Data Cable for BBC	**£6 (d)**
MIRACLE WS4000 V21/23	**£169 (b)**
MIRACLE WS3000 V21/23	**£295 (b)**
MIRACLE WS3000 V22	**£495 (b)**
MIRACLE WS3000 V22 bis	**£650 (b)**
WS3022 1200/1200 fd	**£395 (b)**
WS3024 2400/2400 fd	**£570 (b)**
BBC Data Cable for WS3000/4000	**£7 (d)**

PROGRAMMINGS ACCESSORIES/SOFTWARE

See page 8 for detailed specification

Compatible with B, B + and Master

EPROMER II while stocks last.	**£89 (b)**
Eprom Ryter (Epromer III) See page 8 for details.	**Approx £119 (b)**
MPROMER	**£49 (c)**
META ASSEMBLER	**£145 (b)**
PORTAL EPROM EMULATOR 128K	**£185 (b)**
PORTAL EPROM EMULATOR 512K	**£285 (b)**
TEAM Disassembler	**£145 (b)**

EPROM ERASERS

UV1B 6 eproms, safety cutout	**£47 (b)**
UV1T 6 eproms, timer, safety cutout	**£59 (b)**

TECHNOMATIC

BBC COMPUTERS & ECONET CENTRE

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305 Edgware Road, London W2 Tel: 01-723 0233

CAD/DRAWING PACKAGES

NovaCad Cad Package for B, B+ & MASTER. (See page 9 for specification)

Tracker Ball/Mouse Version (TM)	£79 (d)
TM Version plus Tracker Ball	£119 (c)
TM Version plus Mouse	£105 (c)
Plotter Driver Generator	£25 (d)

MOUSE

AMX MOUSE with SUPER ART (pse specify B, B+ or Master)	£63 (d)
Super Art	£43 (d)
PAGEMAKER	£39 (d)
MAX	£17.35 (d)

RB2 TRACKER BALL

RB2 Tracker Ball with Icon Master (for B, B+ & Master)	£59 (c)
RB2 Tracker Ball with Cursor Control Rom (for Master only)	£59 (c)
RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software)	£47 (c)
Cursor Control Rom for Master	£12.50 (d)
MIRRORSOFT FLEET STREET EDITOR incl VAT	£39.50 (d)

CP/M SOFTWARE

for Acorn, Torch & Multiform Z80 Processors

MICROPRO's Wordstar Professional	£310 (a)
ASHTON TATE's DBASE II	£310 (a)
SUPERCALC II	£195 (a)

Send for details on our full range of CP/M & PC DOS packages for Business, Communications & High Level Languages.

All software supplied by us is known to operate with the appropriate Acorn Disc filing systems. We **cannot** *comment on their use with other DFS systems.*

BBC SOFT/FIRMWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE Acorn's database with display in any mode in spreadsheet or user defined card format and powerful sort facilities. Max file size 4Mb	£37 (d)
STARdataBASE A fast machine code, true random access database. Upto 4000 records/file, 69 fields. Fully menu driven, user defined record layout, very fast searches thru keysearch facility. Mailmerging from VIEW and WW.	£39 (d)
MASTERFILE II Highly popular economically priced database. 17 fields per record, file size limited by drive capacity only. (40T or 80T) Please state DFS or ADFS	£17 (d)

WORD PROCESSORS

VIEW 2.1	£37 (d)
VIEW 3.0	£56 (c)
VIEW INDEX	£12 (d)
VIEW PRINTER DRIVER GENERATOR	£7 (d)
DOT PRINT PLUS Full details on page 5 NLQ rom for Epson FX/RX, MX and GLP.	£28 (d)
WORDWISE	£24 (d)
WORDWISE PLUS	£38 (d)
WYSIWYG PLUS See page 7 for details.	£21 (d)
INTERWORD (If you own a WW+ then quote your reg number and pay £39).	£46 (d)
SPELLMASTER	£49 (d)
WORDEASE A 16K rom based utility for WW+	£24 (d)
SPELLCHECK III A 16K rom based spellcheck program for View and WW. Contains 2000 words on the rom and 6000 (expandable to 17000) words on a disc.	£31 (d)
EDWORD II (Please specify model B, B+, Compact or Master).	£43 (c)
EDWORD II Applications package	£27 (c)

SPREADSHEETS

VIEWSHEET Acorn's spreadsheet provides 255 cols and 255 rows and will operate in any mode. Fully compatible with VIEW and 6502 2nd processor.	£37 (d)
WINDOMATIC Enhances the power of Viewsheet See page 9 for details.	£15 (d)
VIEWPLOT A disc based plotting program. (To be released soon).	£22 (d)
INTERSHEET The new spreadsheet from Computer Concepts with many advanced features like 105 col mode, holding several spreadsheets in memory at a time etc.	£39 (d)
INTERCHART Graphics package for Intersheet	£27 (d)
ULTRACALC BBC Publications very popular and well proven spreadsheet rom includes graphics utility disc.	£52 (d)
MINI OFFICE II (for BBC B) A suite of inexpensive but extensive word processor, database and spreadsheet packages. (40T or 80T)	£14.75(d)
MINI OFFICE II (Rom)	£48 (d)

LANGUAGES

META ASSEMBLER Multi processor Assembler full details on page 8	
TEAM DISASSEMBLER	£145 (b)
MACROM A very fast full featured macro assembler rom from 6502 and 65C02 codes, allows use of macros from library disc. Assembly can be disc to memory, memory to memory, memory to disc and disc to disc thus allowing very long source code upto the length of disc in use. About 3 times as fast as ADE and 30% more economical in memory.	£33 (d)
ACORN MICRO PROLOG Logic programming language used extensively in the artificial intelligence field. A simple 'front end' is supplied to make syntax more friendly.	£62 (d)
ISO-PASCAL Acorn's full implementation of International Std Pascal on 2x16K roms.	£48 (c)
ISO PASCAL STAND ALONE GENERATOR	£30 (d)
OXFORD PASCAL A fast P-code compiler and stand alone utility (40 or 80 T) Specify B or B+.	£36 (d)
OXFORD PASCAL for Master	£52 (d)
BCPL	£46 (c)
BCPL STAND ALONE GENERATOR	£39 (d)
ACORN LOGO	£46 (c)
LOGOTRON LOGO	£55 (c)
BBC PUBLICATIONS OPEN LOGO	£59 (c)
ACORN LISP ROM	£39 (d)
ACORN FORTH ROM	£39 (d)
ACORN COMAL ROM	£43 (d)
MICROTEXT A frame based authoring system from NPL for interactive computer tutoring. Disc based	£52 (c)
MICROTEXT PLUS Extended Features incl extra memory, control of external devices etc. Rom based.	£229 (b)

COMMUNICATIONS

TERMULATOR Advanced terminal emulator which includes VT52/100, Tektronics 4010, teletype emulations.	£25 (d)
COMMSTAR A highly popular communication rom suitable for all general purpose applications (specify B or Master)	£28 (d)
COMMUNICATOR A full 80 col VT100 emulation program with easy to follow screen menus.	£49 (d)
DATABEEB A variety of facilities for use with WS2000 Modem	£26 (d)
COMMAND (specify the modem type)	£34 (d)

COMPACT
(all on 3½" disc)

ARTROOM	£27 (d)
FONTWISE+	£22 (d)
FONT EDITOR	£22 (d)
RAMROD	£37 (d)
BROM PLUS	£32 (d)
MACROM	£37 (d)
BETABASE	£27 (d)

UTILITIES

ACCELERATOR	£49 (d)
ACORN BASIC EDITOR	£22 (d)
MONITOR (BBC Pub)	£34 (a)
BROM PLUS	£26.50 (d;
SLEUTH	£23 (d)
TOOLKIT PLUS	£31 (d)
TOOLBOX 2 (BBC Pub) Manual Cassette	£9.50 (d) £9 (d)
EXMON II	£23 (d)
HELP II	£25 (d)
ACORN GXR GRAPHICS ROM specify B or B+	£22 (d)
PRINTMASTER	£24 (d)
PRINTWISE	£24 (d)
DUMPMASTER supports about 40 printers	£26 (d)
FONTWISE PLUS	£17 (d)
HERSHEY FONT CHARACTER GENERATOR	£18 (d)
ICON MASTER	£29 (d)
MOVIE MAKER Two Roms + Cassette	£26 (d)
ADV TELETEXT UTILITIES ROM	£7.95 (d)

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(24 hr viewdata system)
Tel:01-450 9764

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government depts &
educational establishments

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change without notice
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(a) £8.00 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00

BBC PUBLICATIONS EDUCATIONAL SOFTWARE

A series of programs developed in many cases alongside Radio & TV programmes by BBC's Education Department which supplement the classroom studies by moving and colourful displays helping in clear understanding of a variety of subjects. Some packages also include audio cassettes.

PRIMARY EDUCATION

ASTRONOMY:
9-12 years. Phases of moon, eclipses, seasons etc. Includes a game. **Disc £11 (d)**

COMPUTERS AT WORK:
The Work Game illustrates two of the most important computer applications: Robotics & IT. Incl. a database prog, word processing tutorial and a robotic control prog. **Aud/EC/disc £16 (c)**

PICTURE CRAFT
An inexhaustible, versatile and flexible suite of programs to design shapes & patterns, paint them and convert them into pictures, puzzles and games. **Disc £17 (d)**

INTRODUCING GEOGRAPHY
9-13 years. Four exciting graphical adventures include river navigation, flying, mountain climbing and desert crossing. **Disc £16 (d)**

MATHS WITH A STORY 1
Four primary level programs incl symmetry, co-ordinates and probability for children of wide ranging abilities. **Cass £8 (d)**

MATHS WITH A STORY 2
Similar programs as 1 but covered from a different angle. **Cass £8 (d)**

NUMBER GAMES:
6 programs designed to stimulate the mind of an active child of 8 years and upward. **Cass/EC £7.50(d)**

USING YOUR COMPUTER
8/12 years. Introduction to computers using synchronised audio techniques. Total of 80mins of audio & 14 progs. **Cass £24 (c)**

WORD PLAY
An elegant but simple introduction to word processing using animal shapes for editing functions. Fun manual for the children. **Cass £10 (d)**

WORD MOVER
A simple text editor. **Cass £8 (d)**

SECONDARY LEARNING

TECHNOLOGY & DESIGN Pt1 **£21.50 (c)**
ELECTRIC FIELDS **£10.50 (d)**

ADVANCED LEVEL
STUDIES: STATISTICS
6 progs covering central concepts and principles. Topics include Discrete Data & Binomial Distribution. Eont. Data & Normal Data Distribution. Hypothesis Testing & Confidence intervals, Central Limit theorem & Estimation, Simulations, Correlations and Regressions. **Disc £23 (d)**

ADVANCED STUDIES: GEOGRAPHY
4 progs covering social geography: Traffic & Town planning, drainage & basin management and planning for industry. **Cass £10 (d)**

INSIDE INFORMATION
Designed to introduce IT to young adults. Suitable for use in sec. schools, ITeCs & Adult Educ. Centres.
Prog Cass £10 (d)
Audio Cass £5 (d)
Book £8 (d)

SCIENCE TOPICS (ST)

S.T.: WAVES
A Physics program allows display of waveforms and shows changes caused by different parameters. **Disc £14 (d)**

S.T.: RELATIONSHIPS
A Biology program giving a sophisticated simulation exercise based on data from W.H.O. **Disc £14 (d)**

S.T.: BONDING
A Chemistry program to reinforce & strengthen the concept of bonding of elements. Transfer and sharing of electrons are both shown graphically. **Disc £14 (d)**

S.T.: ELECTROMAGNETIC SPECTRUM
A graphical adventure prog to test your knowledge of the electromagnetic spectrum. **Disc £14 (d)**

S.T.: ELECTRONICS IN ACTION
Program about using computers for control. Control is achieved by using 6502 assy lang. Prog editor is supplied. **Disc £14 (d)**

S.T.: NEWTON & THE SHUTTLE
A interactive prog in 3 parts covering launch to recapture of a satellite to test the knowledge of Newtonian mech. **Disc £19 (d)**

S.T.: ECOLOGY
Simulation program managing a nature reserve to meet a host of individual needs. **Disc/EC £19 (d)**

S.T.: POLYMERS
Students run a manufacturing co. and have to choose best materials for their products and compete with a rival co. run by the computer. **Disc/EC £19 (d)**

S.T.: CLASSIFICATION & PERIODIC TABLE
A database program for producing different classifications of chemical information and presented in any format. **Disc £20 (d)**

S.T.: FOOD & POPULATION
Simulation in space of biological aspects of nutrition and food production logistics. **Disc £20 (d)**

SEC. SCIENCE: MICROTECHNOLOGY
Fundamental concepts of electronics Logic & Resistor Tutors, Servo Cct simulation & a cct design program. **Cass £7 (d)**

SEC. SCIENCE: THE MOLE CONCEPT
A computer sync. audio program explains definitions of atomic & molecular masses and depicts molar equations. **Disc/Aud/EC £16 (c)**

SEC. SC.: UNIFORMLY ACCELERATED MOTION:
Illustrates basic eqns., uniform acceln, under gravity and an idea of terminal velocity. **Disc/AUD/EC £16 (d)**

GENERAL

VU TYPE PROFESSIONAL
An enhanced and expanded version of Vu Type with 63 Pitman approved exercise. **Disc £19 (d)**

WHITE KNIGHT MK II **Disc £16 (d)**
(Specify it for Master).

BATTLEFIELDS **Cass £8.50 (d)**

A VOUS LA FRANCE
A home study aid for anyone learning French.
Cass/EC £17 (d)
Book £5.25 (d)
Additional charge for discs **£9.00**

DEUTSCH DIREKT
Disc based vocabulary learning prog with audio cassette to help with pronounciation.
Disc/aud/EC £16 (c)
Book £5.95 (d)

MODEM MASTER **£11 (d)**

Cassette based programs listed above can be supplied on disc at an extra charge of £1.50 per disc and please specify the format required 40 or 80T.

PRINTER ACCESSORIES

EPSON ACCESSORIES:

Interfaces:

8143 RS232	£30 (d)
8148 + RS232 + 8K	£65 (d)
8165 IEEE + Cable	£65 (d)
8132 Apple II	£60 (d)
8177P NLQ for FX80 + /FX100 +	£99 (d)

Parallel & Serial Buffers of various size also available.

FX80/80 + /85 Tractor Attachment	£29 (c)
LX80/86 Tractor Feed	£21 (c)
LQ800 Tractor Feed	£47 (b)
LQ1000 Tractor Feed	£52 (b)
EX800/1000 Colour option	£59 (b)
H180 HP GL Emulation Rom + Ram	£63 (c)
H180 Printer Emulation Rom	£38 (c)

SHEET FEEDERS:

8338 LX80	£52 (b)
8333 FX100 + /105	£169 (a)
8331 FX80 + /85	£129 (b)
LQ800	£135 (b)
LQ1000	£179 (b)
EX800	£135 (b)
EX 1000	£309 (b)
FX 800	£135 (b)
FX 1000	£179 (b)

Ribbons:

RX/FX100/100 + , FX105	£7 (d)
RX/FX80/80 + , FX85	£4 (d)
LX80	£4.50 (d)
LQ800	£8.50 (d)
LQ1000	£10 (d)
EX800/1000	£7.50 (d)
H180 Pen Set (Aqueous/Ball point)	£7.50 (d)

Dust Covers:

FX80	£5.50 (d)
TAXAN/Canon KP810	£6 (d)
FX100	£7.50 (d)
KP910	£7 (d)

HITACHI 672 Plotter

Aqueous Pen Set six pens	£18.50 (d)
Oil Based Pen Set six pens	£25.00 (d)

TAXAN CANON Accessories:

RS232 + 2K interface	£63 (d)
Ribbon, KP810/815/910/915	£6 (d)

Star Printer

NL10 Sheet Feeder	£52 (b)
NL10 RS232 Interface	£69 (c)
NL10 IBM Type Interface	£39 (c)
NL10 Ribbon	£4.50 (d)

National Panasonic KX P1080/81

Spare Ribbon	£4.50 (d)
Serial Interface	£39 (c)
KXP3131 Tractor	£90 (a)
KXP3131 Sheet Feeder	£189 (a)

JUKI 6100

RS232 Interfaces	£65 (d)
Tractor Feed	£149 (a)
Ribbon (Carbon)	£2.00 (d)
Spare Daisy Wheel	£14 (d)
Sheet Feeder	£182 (a)

BROTHER HR20

Daisy Wheel	£18 (d)
Tractor Feed	£116 (a)
Spare Ribbon Nylon	£3.00 (d)
Spare Ribbon Carbon	£4.50 (d)

INTEGREX INK JET COLOUR PRINTER

Spare Ink Cartridge Black	£9 (d)
Spare Ink Cartridge Colour	£15 (d)
Paper Roll	£7 (d)

Printer Leads:

BBC Parallel Lead (1.2m)	£6 (d)
BBC Serial (Epson) Lead (1.2m)	£7 (d)

Other lengths can be supplied on order:

IBM Parallel Lead (2m)	£12 (d)

PAPER & LABELS

Plain Fanfold paper with micro perforations:

2000 sheets 9½"x11" 60 gsm/sq m	£12 (£3)
2000 sheets 14½"x11" 60gsm/sq m	£18.50 (£4.50)
1000 sheets A4 90 gsm	£12 (b)

Labels/1000:

Single Row 3½ × 1 7/16"	£5.25 (d)
Triple Row 2 7/16" × 1 7/16"	£5 (d)

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ACW443 CAMBRIDGE WORKSTATION

A complete self-contained workstation with:.

- NS32016 8MHz Main Processor & 32081 FP processor.
- 20 Mbyte Winchester and one 80T Ds floppy drive.
- A detachable keyboard Hi Res RGB Monitor.
- 4Mbyte of on board Ram as standard.
- Languages supplied include: Fortran 77, Pascal, C, Cambridge LISP, 32016 Assembler & 32bit BASIC.
- Utilities on the operating system to cross link programs between different languages, utilities for porting programs to mainframes.
- **Phone for detailed leaflet.**

32016 CO-PROCESSOR

A second processor that brings genuine 'Mainframe' power to the BBC Computer.

- Interfaces with the BBC through the tube connector.
- NS32016 6MHz CPU & 32081 FP processor.
- 1Mbyte Ram as standard.
- Packaged software includes all the languages and utilities supplied with the ACW Work Station.
- **Phone for detailed leaflet.**

CPU/FP Upgrade Kit (Acorn recommended) for the Co processor for 10 Mhz operation to enable faster processing. No fitting charge if supplied with the Co Processor

TIME WARP Real Time Clock with PANOS utility allows screen display of time, day and date within PANOS at anytime and allows these data to be printed on documents. Model B users will find this particularly useful.

512 CO-PROCESSOR

Brings professional software to the BBC Master.

- 10 Mhz 80186 *DOS PLUS.
- GEM Write & GEM Draw.
- 'WIMP' Environment with high quality Mouse.
- Runs many 'IBM' programs — even 'Flight Simulator'!
- Convert to/from IBM/BBC data.

DOTPRINT PLUS

A uniquely versatile NLQ ROM for the BBC Micro.

- Built-in character font generator.
- Built-in view printer driver.
- Supports microspacing for professional justification in View & with disc in Wordwise/Plus.
- True bold print as well as double width.
- 12 character pitch as standard.
- Fully variable pitch and line spacing.
- Suitable for fully **'EPSON'** compatible printers with quad-density graphics.
- **DOTPRINT PLUS** for EPSON FX/RX and compatibles.
- **DOTPRINT DUAL** for EPSON MX range.

MICROJUSTIFIED TEXT

homes of a ruling class whose right to rule was based on the ownership of land. Large estates produced money; perhaps even more important, they supplied people to fight for their

NORMALLY JUSTIFIED TEXT

homes of a ruling class whose right to rule was based on the ownership of land. Large estates produced money; perhaps even more important, they supplied people to fight for their

Notice how MICROJUSTIFICATION eliminates 'stretched' spaces between words.

FREE BUNDLED SOFTWARE WITH THE BBC MASTER

We now supply the Master 128K Computer with educational software which enables immediate use of the computer.

The software package includes:

VU-TYPE DISC
The popular 'sight and sound' touch-typing tutor using colour graphics.

WORDMOVER
A program to help develop the vocabulary of primary school children

WORD PLAY
An elegant and simple program to introduce primary school children to the concept of word processing.

DRAWSTICK
A simple drawing program

LOCO MOTION
An animated game giving the player control of a train travelling around a network of some 50 screens.

Authorised dealer for
"Advanced Interactive Video System"
Please send for details on the equipment and subsidies available to schools

EPSON PRINTERS

Epson have launched a new series of printers to update the FX range. The new **FX800** and **FX1000** range combines printing versatility and superior technical features with the highest standards of reliability. The features include two NLQ fonts, 10, 12, 17, and 20 cpi, dble ht and dble width, 200 cps in draft and 40 cps in NLQ, tractor and friction as standard, IBM compatible, full graphics, 8K buffer, Parallel interface.

EPSON EX8000/1000
This range offers high speed printing to offer versatility in volume printing with speeds of 300 cps in 12 cpi mode. Four colour printing option is available for these printers.

EPSON LQ800/1000
This range with its 24 pin print head offers the highest standards in letter quality printing at high speeds while maintaining the versatility of dot matrix printers. The hex density graphics capability produces about the best printout any dot matrix printer can produce.

STAR NL10

A 80 col 120 cps printer with fine NLQ at 30 cps offers novel and innovative features. There are no dip switches to set, full control from the front console. Plug in interface cartridge simplifies adaptation to different computers. Friction & Tractor feed as standards. Epson Compatible Graphics.

NATIONAL PANASONIC KX P 1081

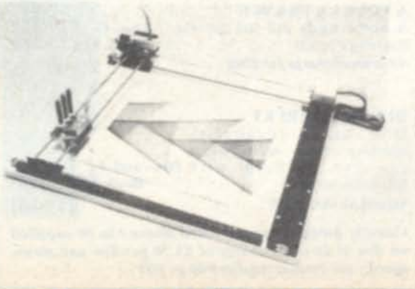
A high performance low cost printer with full character pitch feature 10, 12, 15 & 17 cpi and proportional spacing in both draft and NLQ mode. 80 column, 100 cps draft and 20 cps in NLQ. Parallel interface and Friction and Tractor feeds as standard. Epson/IBM Compatible Graphics.

HITACHI 672

- A3 four colour precision plotter.
- Serial and parallel ports as standard.
- Produces 'OHP' transparencies as well as plain paper.
- 'HP' graphics language or single character commands.

GRAPHICS WORKSTATION

A A3 pen plotter with 0.1mm resolution allows graphs, charts, architectural drawings to be plotted using the 9 predefined plotting instructions or by using a CAD package. The pen mount allows a variety of pen types including drawing pens to be used or the following range of accessories to be fitted.



OPTICAL SENSOR

This converts the plotter into a input device and offers a new range of applications: Scan or digitise a picture or a drawing to display or store. Traverse mazes and investigate methods of artificial intelligence. Reliably read bar codes.

DRILL/ROUTER

This will drill holes, machine moulds and cut complex 3-D shapes in a range of suitable materials to a depth of 16mm. Driver software is supplied on disc and an optional application program is available to interface the drill/router to our NOVACAD package.

SCRIBER

The sharp pointed scriber may be used to etch fine line drawings on surfaces such as scraperboard, wax coated copper etc. Full details on request. See page 1 for price.

All accessories available separately if required.

TECHNOLINE
(24 hr viewdata system)
Tel:01-450 9764

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Telex:922800

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Tel:01-208 1177 Telex:922800
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West End Branch
305 Edgware Road, London W2
Tel:01-723 0233
(near Edgware Road ⊖)

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using VISA/Acess Card

Orders welcome from
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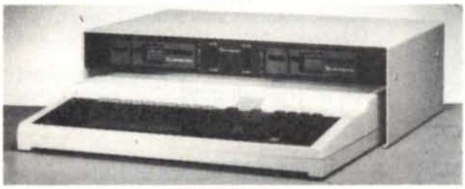
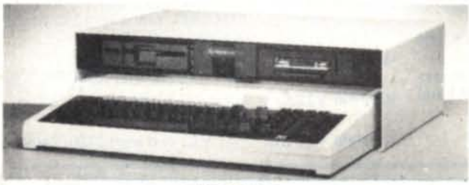
All prices ex VAT.
Prices are subject to
change without notice
Please add carriage
(a) £8.00 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00

TS 400

PD 800


PD 800 P


P2041 HT

DISC DRIVES

TECHNOMATIC offers a wide combination of high quality, high performance drives to meet all needs of BBC micro users. Please see our detailed and competitive price list on page 2.

*** All Technomatic drives are fitted with quality slim line ultra low power mechanisms capable of single and double density operation and offering very fast track access and head settling times.**

*5.25″ floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.

*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.

*The plinth version drives provide for a neat and compact system installation giving it a more professional look.

*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with suitably fused 13A moulded plug.

*PD853 Combo drive includes a combination of 5¼″ (40/80T switchable) and a 3½″ 80 Track Double Sided mechanisms. Complete with mains p.s.u. Ideal for software conversion for 5¼″ to 3½″ or vice versa.

Such is our faith in Mitsubishi mechanisms that we offer a two year warranty on our floppy drives

WINCHESTER DRIVES

Mass storage 20 Mbyte drives are available in the following versions:

- P20HD Stand alone.
- P204HP With a single floppy housed in a plinth version case.
- P214TS Top of the range with a 10 Mbyte back up streamer and a single floppy housed in a plinth type casing and supplied with backup utilities.
- TS10 A stand alone 10Mbyte streamer for those who are already equipped with a Winchester and a floppy drive. Utilities for backup can only be loaded from a floppy.

All models are fully compatible with Acorn's ADFS system and include a mains psu and the necessary cable connections.

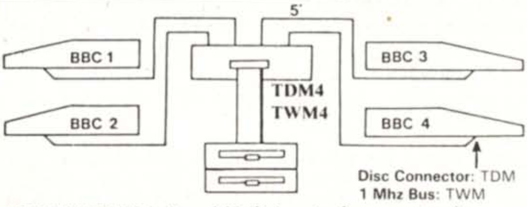
ALL TECHNOMATIC FLOPPY DRIVES NOW CARRY A TWO YEAR WARRANTY

FLOPPICLENE
Disc Drive Cleaning Kit

Floppiclene introduces a positive concept in ensuring continuous high performance of the disc drives by providing an easy and efficient method of keeping the drive heads clean. Use of disposable cleaning discs eliminates the risk always present in reuseable discs of recontamination and abrasion of the sensitive drive heads. Available for both 5.25″ and 3.5″ drives. Please see page 2 for prices.

DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications – simply plugs into the computers drive port connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same drives, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5′ of cable per outlet as standard. Mains powered.



TDM4/TWM4 Quad Unit (up to 4 computers)
TDM2/TWM2 Dual Unit (2 computers)

WINCHESTER DRIVE MULTIPLEXER

A unique addition to our hardware range that allows the sharing of a Winchester between a number of computers. The principle of operation is the same as our highly popular disc drive multiplexers and there is no need for any additional software or hardware modifications. The Multiplexers are available in two versions, a dual unit for two computers and a quad unit for four computers to share a Winchester. Multiplexers are particularly useful for accessing common software and transferring data. Care needs to be excercised for certain types of random access files.

TECHNOMATIC

BBC COMPUTERS & ECONET CENTRE
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305 Edgware Road, London W2 Tel: 01-723 0233

MODEMS

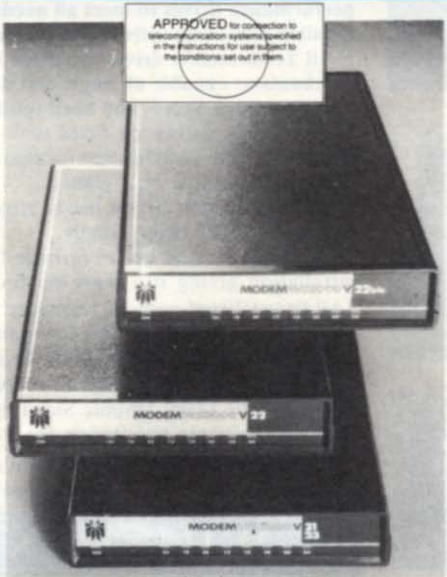
MIRACLE WS4000

- A cost effective intelligent modem that offers the best value for money bringing the world of data communication within easy reach.
- Plain English commands make it simple to use, even for the first time user.
- Latest Hayes-type protocol commands, auto dial, auto answer, auto speed seeking.
- Equalisation model in V23 for line-noise filtering.
- Many other options including upgrading to V22 and V22 bis.

MIRACLE WS2000

- A comprehensive manually switched 'World Standard' modem.
- Competitively price with a capability to be upgraded for various options.
- BT approved for V21/V23, 300/300, 1200/75 and 1200/1200 half duplex.
- Includes BEL103/113/108 standards for use outside UK.

Optional extras include (Not BT approved).
- SK1 chip set for computer control.
- User port cable.
- Auto dial Board.
- Auto Answer Board.
- DS1 disc for auto dial facilities on Commstar.


APPROVED for connection to telecommunication systems specified in the instructions for use subject to the conditions set out in them
MODEM V22bis
MODEM V22
MODEM V21 23

WS 3000 Range

Miracle have introduced two new models in the WS3000 series for users who require a modem for a specific use. Model WS3022 provides 1200/1200 baud full duplex operation whilst only WS3024 provides 2400/2400 baud fd only.

Please see page 2 for prices

MIRACLE WS3000 RANGE

- A professional range of intelligent modems with full BABT approval.
- Auto Answer and Auto Dial facilities installed as standard.
- HAYES protocols implemented.
- Pulse or DTMF 'tone' dialing.
- Plain English command structure simplifies the use of the modem.
- Integral parallel printer port fitted as standard configurable for both input and output for process control applications.
- A line sharing facility to differential between data and voice calls.
- Intelligent speed buffering converts 1200/1200 terminals to 1200/75
- Equalisation mode for line noise filtering.
- Internal battery back up for storing 63 names, numbers and default settings.
- Upgrade path for 1200/1200 and 2400/2400 and security encryption.
- Applications in the field of graphics and text access, high speed telex, user to user, and user to main frame.

SPECIFICATIONS

WS4000 V2123:	*CCITT V21/V23. *300/300, 600 and 1200 half duplex, 1200/75.
WS3000 V2123:	*CCITT V21/V23/Bell 103. 300/300, 600 and 1200/75
WS3000 V22:	*As V2123 and also 1200/1200 full duplex.
WS3000 V22 bis:	*As V22 and also 2400/2400.

MULTIFORM Z80

A unique Z80 2nd Processor with a 'MULTI FORMAT' capability.

includes a FREE Pocket Wordstar package

- Multiform Z80 will run most CP/M 2.2 formats on the BBC.
- 28 different formats including Acorn Z80, RML 380Z & 480Z, EPSON QX, Amstrad, Osborne etc, supplied on the library disc with the utility to create additional formats.
- Emulates the two of the most commonly used CP/M terminals, HAZELTINE 1500 and ADM-3a in addition to the Acorn VDU making installation of most of the software packages easy.
- Utility to inter convert ASCII text wordprocessed on a standard BBC and under OS/M or CP/M.
- 8271 allows single density CP/M formats whilst 1770 DFS allows both single and double density CP/M formats. Single or dual drive, 40 or 80 track format and SS or DS drives can be used providing the CP/M format matches.
- Dual drive will allow two separate formats to operate simultaneously for data transfer making it ideal for use in environment where machines with different formats are in use.
- Utility to read and write on IBM PC DOS discs available as an optional extra. Utility will also format a PC DOS disc.
- Multiform Z80 is supplied with a OS/M operating system rom, System disc and a Library disc. Please specify the DFS type and the drive format when ordering.

WYSIWYG PLUS

NEW

This new screen/printer utility not only allows you to see on the screen exactly how the text is going to appear on the paper when printed but also simplifies the printer control codes that you need to use to get the different effects.

WYSIWYG + can be used in BASIC or from within most popular word processors like View, Interword & Wordwise Plus.

The printer commands have been simplified to meaningful words so that the user does not have to either remember or keep referring to the printer manual and try to decode the commands to VDU format. For example: *ENGLARGED will display enlarged text on the screen and send the appropriate command to the printer to print in enlarged mode.

Some of the features you could see in WW + or from BASIC include:
*SUBSCRIPT, *SUPERSCRIPT, *ENLARGED, *BOLD, *EMPHASISED, *CONDENSED (up to 132 characters on screen), *PICA, *ELITE, *GRAPHICS (design your own logos and symbols), *UK, *FRENCH, *US, *TELETEXT (character sets), *BACKSPACE (for overprinting), *DOWNLOAD (new characters or fonts).

Simply plug in the WYSIWYG+ rom in your computer and utilise the features built in to your printer with ease and least bother to produce the results you know are possible but not so simple to achieve. No other single package offers this much flexibility and simplicity to get the best from your printer.

WYSIWYG+ rom is supplied with a comprehensive manual.

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(24 hr viewdata system)
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London NW10 1ED
Telex:922800

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West End Branch
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Prices are subject to
change without notice
Please add carriage
(a) £8.00 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00

EpromRyter
(Epromer III)
Eprom Programmer

An enhanced version of the highly successful EPROMER II providing added sophistication to the eprom programming applications on the BBC computer range. The new software also utilises the extra facilities of the BBC Master computer. The programming methods are 'state of the art' of programming technology for fast, efficient and cost effective operation.'

The single rail eproms handled by the EpromRyter are:
● 2716 2732 2764 27128 27256 27512 27513 27011
2516 2532 2564 (NMOS & CMOS)
● One time eproms P27XXX, 87CXXX etc.
● Also A suffix eproms such as 27XXXA

The software is menu driven, many operations being single key. On screen help clarifying the operation being carried out. Will make the programming process very simple and easy for both specialists and novices alike. EpromRyter will operate in the same manner as Epromer II when used with BBC Model B and B+ and will require the Epromer II software.

The main features of the programming software are:

- Device, function and voltage selection from the computer keyboard.
- Continuous display of the options selected.
- All eproms upto 27512 (64K) programmed in single pass.
- Automatic Intelligent identifier support for eproms able to respond.
- Selectable programming voltage 25/21/12.5V
- 3 programming methods: Normal, Intelligent & Pulse (20 sec for a 27128).
- Serial port protocols supported.
- Intel HEX, Motorola S, HEX and ASCII protocols supported.
- DFS, NFS, ADFS and Rom Filing System Supported.
- BASIC/Machine Code programming using RFS.
- Powerful editor with input in HEX or ASCII. * Full editable 64K file.
- Block move of data within the address range.
- User can select any section of the eprom from single byte to the full address range to blank check/burn/verify. Facility to program single bytes makes program development/amendment simpler.
- Multiple loading for ROM Filing System

Some of the above features apply to Master Computers only

EpromRyter interfaces with the BBC through the 1 MHz bus, has a mains power supply and is fitted with a 3M TEXTOOL ZIF socket to provide consistent and reliable service for a long period.

META Version III

"All the good features you would expect to find in a good source code editor are present . . . Meta assembler lives in a different world. It is structured to work with any new processor . . . as new instruction sets can be added . . . as needed . . . has a well featured editor with colour highlighting, a sound modular approach."
Acorn User October 1986

- Assembles for over 30 popular processors, including Z80, 6800/01/02/04/05/09/11 etc — and 68000 — using native mnemonics for each processor, eg. LD A, (HL) for Z80 and MOV AO, $1000 for 68000 etc.
- Fully integrated Editor: four field, all search, search/replace, block copy, delete, move, marked save, load etc.
- Compatible with Portal Eprom Emulators and Team Disassemblers.
- Send object code in Intel Hex, S-Record, straight binary etc. down to discs, RS232, parallel port, Eprom Emulators etc — all **during Assembly.**
- Over 50 directives included as standard: handling nestable macros, conditional assembly and twenty types of table definition directives.
- 32 bit labels; 31 character names. Arithmetic and Boolean arithmetic to 32 bits.
- Modular source code with numeric and string parameter passing.
- Serial communicator area with eight options lines: echo, control code trap, LF supression/addition etc.
- Over 500 in use throughout the world in universities and many different industries.
- Two 16K Roms, two 80 track discs, A4 ring-band manual, function-key strip.

PORTAL EPROM EMULATORS

- Emulates 2716, 2732, 2764, 27128, 27256, 27512 eproms at 150ns Access time.
- Load at 4Kbytes/second — No "erase" time.
- 28 pin header plugs into Eprom socket on target system — status monitored on 13 Leds.
- Fully software controlled from Meta Assembler.
- 100 times faster than standard EPROM program/erase cycle.
- Fully CMOS compatible; draws no power from target system.
- Four portals may be independently programmed off same user-post cable.
- Complete with all cables, manual and disc.

PORTAL 128 (2716, 2732, 2764, 27128):
PORTAL 512 (2716, 2732, 2764, 27128, 27256, 27512).

MPROMER

An add on unit for Epromer II enabling the user to program 8741, 8748 and 8749 single chip microcontrollers. Now with the aid of cross assemblers such as META, the user can write code for the above devices and then with the aid of Micropromer program the device.

- Simple menu structure with on screen help. i.e. select a function and on the screen will appear details of the function being performed.
- Comprehensive error reporting and checking.
- Read, verify, blank check, program from 1 to the maximum byte count for the device being used at any address location.
- Support for DFS, ADFS and cassette filing systems.
- Edit data in Hex or ASCII.
- Total control via software, no switches to worry about.
- Supplied with user manual and software on diskette.
- MPROMER simply plugs into the EPROMER II ZIF socket.

TEAM DISSASSEMBLER

The third part of the Universal Development System: a Meta labelling dissassembler.

Supports 1802, 8080, 8085, HD64180, Z80, 65XX (includes 65 col, 6511 etc), 68XX (includes 00, 01, 02, 03, 08 etc):

- Up to 64K of object code translated back into META compatible source code modules: labels automatically inserted on all jump targets, memory references etc.
- Pre-editing stage allows marking of object code areas as byte, string, word, long word etc, tables. These areas dis-assembled into appropriate directives instead of garbage mnemonics.
- Reconstituted source code ready for immediate re-assembly by META.
- Omniversal search/replace for re-naming arbitary label names with meaningful ones.

BOOKS

No VAT Carriage Code (c)

LANGUAGES	
6502 Assy Lang Prog	£19.95
6502 Programming	£13.95
8086 Book	£23.95
Acorn BCPI User Guide	£15.00
Acorn FORTH	£7.50
Acorn LISP	£7.50
Acorn ISO Pascal Ref Manual	£10.00
Intro to COMAL	£10.00
Intro to LOGO	£7.50
Micro Prolog Ref Manual	£10.00
Introduction to Turbo Pascal	£14.95
Prog the Micro with Pascal	£8.50
The Supervisor's BBC Micro	£10.95
The UNIX Book	£7.50
Unix User Guide	£19.95
Understanding Unix	£18.45
BBC MICRO GUIDE BOOKS	
BBC User Guide Acorn	£15.00
BBC Plus User Guide	£15.00
Drawing Your Own BBC Programs	£6.95
Inside Information	£8.95
Maths Prog in BBC Basic	£7.95
The Friendly Computer Book	£4.50
Toolbox 2	£10.95
VIA 6522 Book	£4.50
PROGRAMMING/UTILITY	
Advanced Sideways Ram User Guide	£9.95
Advanced User Guide (BBC)	£15.95
Advanced User Guide	£12.50
Applied Assembly Language on the BBC	£9.95
BBC Micro Advance Programming	£9.95
BBC Micro Ref Guide (B Smith)	£10.95
BBC Micro Sideways ROM's RAM's	£9.95
Guide to the BBC ROM	£9.95
Beginners Guide to W.P	£7.95
Mastering Assembly Code	£8.95
Mastering Interpreters & Compilers	£14.95
Mastering View, Viewsheet & Viewstore	£12.95
View 3.0 User Guide	£10.00
Viewstore	£10.00
Viewsheet	£10.00
Wordwise Plus	£9.95
SOUND & GRAPHICS	
Computer Graphics & CAD Fundementals	£9.95
Mastering Music	£6.95
DISC DRIVE SYSTEMS	
Advanced Disc User Guide	£16.95
Disc Book	£3.50
Disc Programming Techniques	£7.95
Disc Systems	£6.95
File Handling on the BBC	£6.95
Discovering Disc Drives	£POA
Practical Disc File Techniques	£5.95
Mastering the Disc Drive	£7.95
Mastering Dos plus	£12.95
APPLICATIONS	
Interfacing Proj for BBC	£6.95
BBC and Small Business	£5.75
The Software Business	£5.50

TECHNOMATIC

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NOVACAD

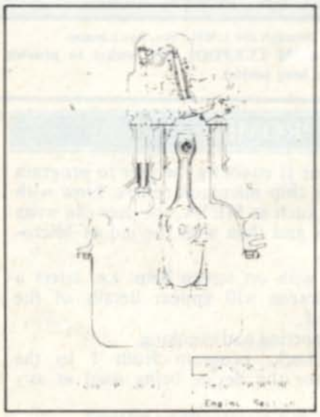
Computer Aided Draughting for the BBC Micro

> *" Novacad can drive a plotter to provide drawings of a high quality... Novacad is excellent. It is flexible, genuinely easy to operate without much practice, and a pleasure to use. "* **Beebug December 1986**

> *" Novacad is a professional package, well worth the £90 for the ROM and disc and is expandable to suit your own particular requirements. I would have no reservations if I heard Novacad called, "the best on the market". "* **A&B Computing August 1986**

A sophisticated CAD package with unique facilities which are generally confined to the professional CAD packages costing thousands of pounds.

NOVACAD is being used in widely differing fields ranging from leading British industries for producing engineering drawings to Accountants' offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing professional quality output are making extensive use of NOVACAD's unique features. NOVACAD is proving to be a invaluable teaching aid in technical schools and colleges simply because of the ease with which it can be used.



MINIMUM HARDWARE REQUIREMENTS

- **Any BBC range computer with Acorn DFS.**
- **40 Track single sided single drive.**
- **Epson compatible dot matrix printer.**

With basic BBC B, NOVACAD operates in mode 4 allowing use of any 2 colours. With shadow memory of the BBC + or the Master, it can also operate in mode 0 for higher resolution or mode 1 for allowing use of any 4 colours, and it will provide additional user memory for more complex drawings.

6502 second processor or the Turbo on the Master will also increase the drawing speed considerably.

The major features of NOVACAD are:

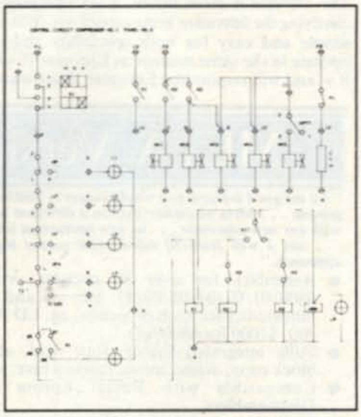
* Simple and easy to use with logical command sequence.
* A large drawing area (approx 15 screens).
* The ability to create complex icons (upto 500 lines instead of the usual 15 to 20 pixels), store them in a library and recall them at different scales and orientations.
* A zoom facility allowing magnification of up to 20 times to insert finer details.
* Block copy of shapes on the screen for repetitive use.
* Text entry at any 90° orientation at any position on the screen.
* Create multi layer drawing with 8 levels available.
* Full compatibility with the BBC range with minimal hardware requirements yet having the capability of exploiting the potential of the extra shadow memory or the second processor's memory and speed.
* Printer routine for Epson 80 and 136 column printers.
* A unique optional facility to output to any BBC compatible plotter.

NOVACAD

is available in two versions

*BASIC version for cursor control from the keyboard.

*T/M version for cursor control from the keyboard. Tracker Ball or a Mouse.



OPTIONAL EXTRAS

Plotter driver generator is available as an optional extra to configure a plotter routine for any BBC compatible plotter. Pre-configured programs for the popular plotters like **Epson HI 80, Hitachi 672, Plotmate, Penman** and **HP GL.** This program allows the drawing to be scaled to the maximum plotter size thus enabling drawing of A2 and A3 sizes to be produced with equal ease. The zoom facility will enable inaccuracies of drawing on the screen to be eliminated.

ROUTCAD, an optional software package for our Graphics Workstation allows for production of shapes drawn using NOVACAD in 3D on suitable material and is ideal for a range of applications including template making and model building.

NOVACAD package includes a 16K ROM, Utility disc and a comprehensive manual.

WINDOMATIC

NEW NEW

All users of Acorn's VIEWSHEET spreadsheet program will be aware of its powerful windowing facility which allows the screen and/or printer to be configured in upto 10 separate windows taken from anywhere in the sheet. They will also be painfully aware of how difficult and time consuming it is to set up a required display. Although VIEWSHEET allows configurations to be saved to the media, it does not have provision for deciphering them.

WINDOWMATIC has been produced with the intention of recitifying these shortcomings and to bring out the very best from VIEWSHEET.

WINDOMATIC provides a quick and easy way to configure screen and printer allowing complicated documents and reports to be set up much more easily. It displays complete text information on all 20 windows and accurate graphic representation of the screen and printer output.

The package includes a screen dump routine for Epson printers and allows use of other printer dump packages.

Windowmatic will work with BBC Master, BBC B + and BBC B fitted with 6502 2nd processor. It is turbo compatible. It can be entered from VIEWSHEET by use of function keys or it may be run by loading a previously saved window configuration from disc. The program is supplied on disc with a comprehensive manual.

TECHNOLINE
(24 hr viewdata system)
Tel:01-450 9764

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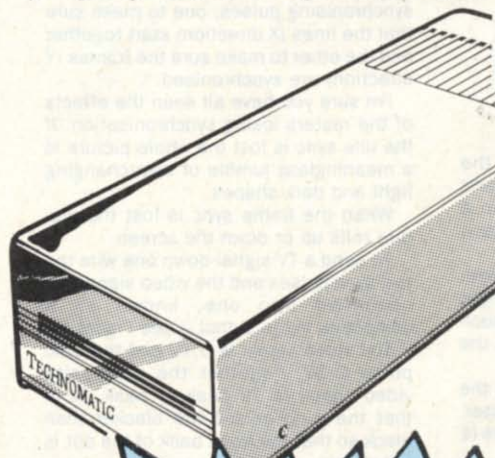
A PRICE BREAKTHROUGH

TECHNOMATIC WINCHESTERS



- * Cased with power supply and cooling fan
- * 1 Mhz bus extension cable
- * Fully compatible with Acorn ADFS and FS III
- * Fully compatible with S.J. Research file server
- * 12 months warranty

10 Mbyte £399 (a);

(This offer valid whilst current stocks last)

Special Adaptor for S.J. Research File Server £28

SPECIAL OFFERS PAGE

VU-TYPE

Do you have finger trouble when typing?
Do your letters look like this?

Dear Sor,
I wuold like to ....

then you need:
VU-type, a complete touch typing program produced by BBC/Pitman.
It allows you to learn at your own pace and has a wide range of exercises. Screen displays show the keys you have pressed and it will report on your speed and accuracy.
Supplied on a 40T Disc with a manual.

Available at a special price of £7.50 (d)
instead of the usual £15. Offer valid while stocks last.

EDUCATIONAL/FUN SOFTWARE BUNDLE

Wordmover
Wordplay
Drawstick
Locomotion

These programs are available on 40T discs and Cassettes.

All for £17.50 (d)
Normal RRP over £40.

3½ DISC DRIVES

- * 400K/640K capacity perdrive in DFS/ADFS modes.
- * Mitsubishi 80 track double sided ultra low power, fast access mechanisms.
- * The drives are supplied fully cased and with cables ready for connection to a computer.
- * Drives powered from the computer
- * 2 years warranty.

Single Drive £75 (b)

Dual Drive £134 (b)

Mike Cook shows how to build a video digitiser

Image processing

IT'S strange how some projects get to be tackled. I had always meant to cover a simple video digitiser – in fact it was mentioned in the very first issue of *The Micro User*. Well this design started out as something quite different . . .

A little while ago I acquired a weather satellite receiver made by Feedback Instruments. I was not too impressed with the design, as once the satellite image had been received there was nothing you could do with it. So I set about designing a circuit that would read the image into the BBC Micro.

This was quite easy, as the logic levels of the image were brought out on a connector, but it was not something that would interest many people, especially as I would not like to encourage anyone else to get one of these receivers.

However, having designed it I found it supplied most of the circuitry needed to make a video digitiser.

So this month I'll describe how to construct the digitiser and next month I will look at the software to drive it – along with a few video tricks it can do.

My aim is to produce as cheap a digitiser as possible so that anyone can dabble with image processing without breaking the bank.

This inevitably leads to some reduction in performance compared with those costing many times more, but nevertheless it is a useful system.

Let's first consider a little theory. A TV picture from a camera or computer is produced by a spot being swept across a cathode ray tube.

The image is made by varying the brightness of the spot at different parts of the screen. This spot is driven in a zig-zag across the screen known as a raster – see Figure I.

This is achieved by applying sawtooth signals to two deflecting coils at right angles. The X sawtooth is very much faster than the Y one so as to form the raster.

The ratio of the two speeds gives the number of lines traced out in the raster. In the usual domestic TV standard this is 312.5.

Now hands up all those who thought we were on a 625 line standard! Well we are: The point is that the pictures we see are made up of two rasters which slot in between each other to give what we call an interlaced scan.

The trouble with interlacing is that when viewed close to, as on a computer display, we can see that the two rasters are produced at different times causing flicker.

This can be removed by having a longer persistence phosphor, viewing from further away or not having interlaced scans at all. Also some people are more sensitive to flicker than others, as they have shorter persistence of vision.

The signal controlling the spot's brightness is called the video signal. It can be derived from a digital circuit, as is the case in computer displays, or from sweeping a spot over a light-sensitive imaging tube, as in a camera.

In addition to knowing the brightness, we must also be able to position the spot at the correct place on the tube. This is done by making sure that the raster on the TV set is exactly in phase with the raster on the imaging tube.

This is done by sending two types of synchronising pulses, one to make sure that the lines (X direction) start together and the other to make sure the frames (Y direction) are synchronised.

I'm sure you have all seen the effects of the rasters losing synchronisation. If the line sync is lost the whole picture is a meaningless jumble of ever-changing light and dark shapes.

When the frame sync is lost the picture rolls up or down the screen.

To send a TV signal down one wire the two sync pulses and the video signal are combined into one, known as a composite video signal – see Figure II.

The video signal is 0.7V and the sync pulse 0.3V. Together the composite video signal is 1V peak to peak. Note that the sync pulses are blacker than black so that the trace back of the dot is not visible.

Incidentally, some years ago the makers of a certain soap powder that washes whiter than white were in trouble for producing TV adverts that exceeded the white level in the video signal.

This had the effect of making the clothes look very bright, but unfortunately it overmodulated the transmitter and caused severe radio interference on police and military channels.

It was some time before the interference was traced to this advert. Needless to say, the video signals of all advertisements are now tested before transmission.

A video digitiser turns the video signal into a number and places it in the computer's memory in a position to allow it to be displayed in the same place as the original picture. The main problem here is that the video signal changes so fast that special provisions have to be made for the transfer.

In expensive digitisers the analogue to digital converter writes directly into the computer's memory – direct memory access or (DMA). In this way the whole picture can be acquired in one frame.

If you adopt this approach on the BBC Micro you will need special memory as

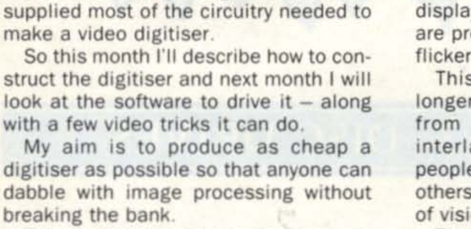


Figure I: A raster scan

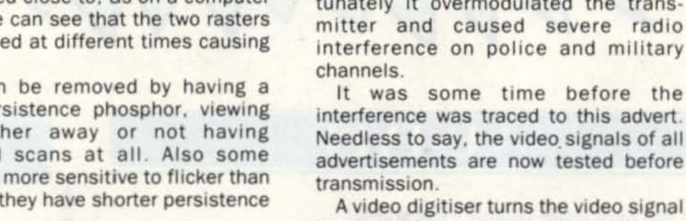


Figure II: A composite video signal

DMA can't be implemented without it.

What we are going to do is to read in the picture over several frames. In this way the computer can keep up with the data coming in, so the picture can't be something fast moving or distortion will occur.

However, interesting effects can be achieved by deliberately moving while the image is being read in.

The simplest way to read in a picture is at one point a line, so in one raster scan we will read in a single column of the picture (see Figure III).

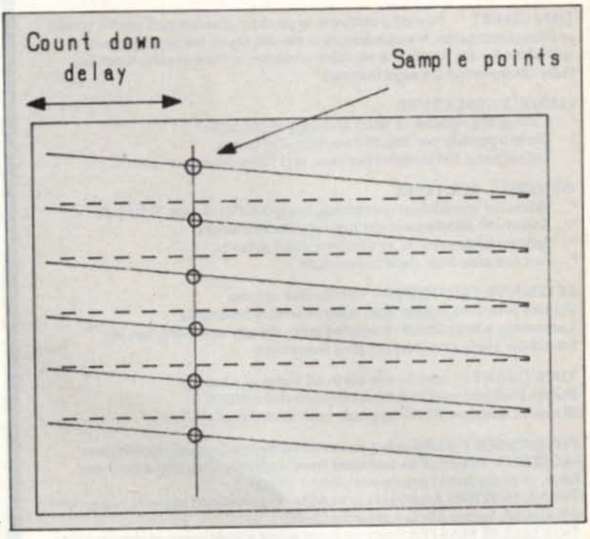


Figure III: A sampled raster

As each scan takes one fiftieth of a second it will take just over three seconds to read in 160 columns.

I originally designed a circuit that could read in two or four points a line, but the software needed to put them in some sensible place in memory could not keep pace.

We use 160 columns, the resolution of a Mode 2 display, which has four bits a pixel. But due to the BBC Micro's design we can only see three bits a pixel, or eight shades of grey. So the digitiser's specification is a 160 by 256 image with 3 bits per pixel – the block diagram is shown in Figure IV.

First the composite video signal derived from a camera or video tape recorder is amplified. Then it is digitised using a flash converter and a continuous stream of data is applied to the latch.

Now we need to clock the latch to capture just the right point on every line. To do this we need to separate the line sync pulses from the composite video and use them to load a countdown counter.

This is decremented by an oscillator, and when it reaches zero the latch is triggered and digital video data is available for the computer to read.

The value loaded into the counter will determine how far along the line we are when the sample is taken. The line sync pulse also stops the oscillator to make sure that the point sampled is at exactly the same place on each line.

The full circuit diagram is shown in Figure V. To save costs we make the flash converter from two ICs containing four comparators each.

One input to the comparator is connected to a resistor chain, the other to the video signal. The two potentiometers at either end of the chain allow us to set the black and the white level.

The comparator's output is then fed into a priority line encoder. This chip is really supposed to arbitrate between interrupt signals, giving a binary output of the highest interrupting signal – just the function we need to convert the output of the comparators into a binary value.

The counter is made from two 74LS193 bi-directional synchronous counters, though in this circuit we are only using them in the countdown mode.

They are loaded from a pair of 74LS93 counters, whose reset line and clock input are controlled from the user port. In this way we can advance the sample point by simply clocking the counter.

A 74LS13 is wired up as a relaxation oscillator. Basically this is an inverting gate, and the output will always be the inverse of the input. These are tied together with a resistor and the delay in the voltage given by the capacitor ensures that the whole thing oscillates.

The frequency may be changed to allow you to adjust the picture aspect ratio. One of the gates' inputs is used to stop and start the oscillator in time with the line sync pulse derived from the sync separator.

This is an LM1881, and also produces both the frame and the odd frame/even frame signals which you need if you are going to work with interlaced signals.

There is room on the latch to feed four bits of video data into the computer but this would need a more complex digitiser. Also you would not be able to see any difference in picture quality due to the way that Mode 2 works.

Note that the pin assignment might at first seem slightly odd. However, look at the way the bits correspond to the pixels in Mode 2, as shown in Figure VI.

It is simpler to scramble them in this configuration in the hardware than to try to do it in software when time is at a premium.

The layout is not critical, and the unit can be made on veroboard, as was my prototype. However, to help you in construction I have laid out a printed circuit board which is available, along with all

Turn to Page 97 ▶

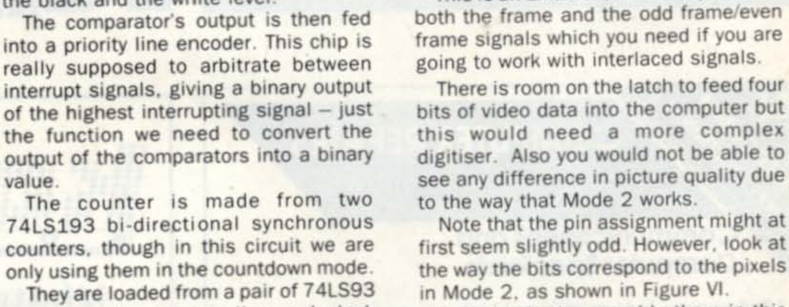


Figure IV: Block diagram of the digitiser

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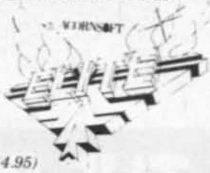

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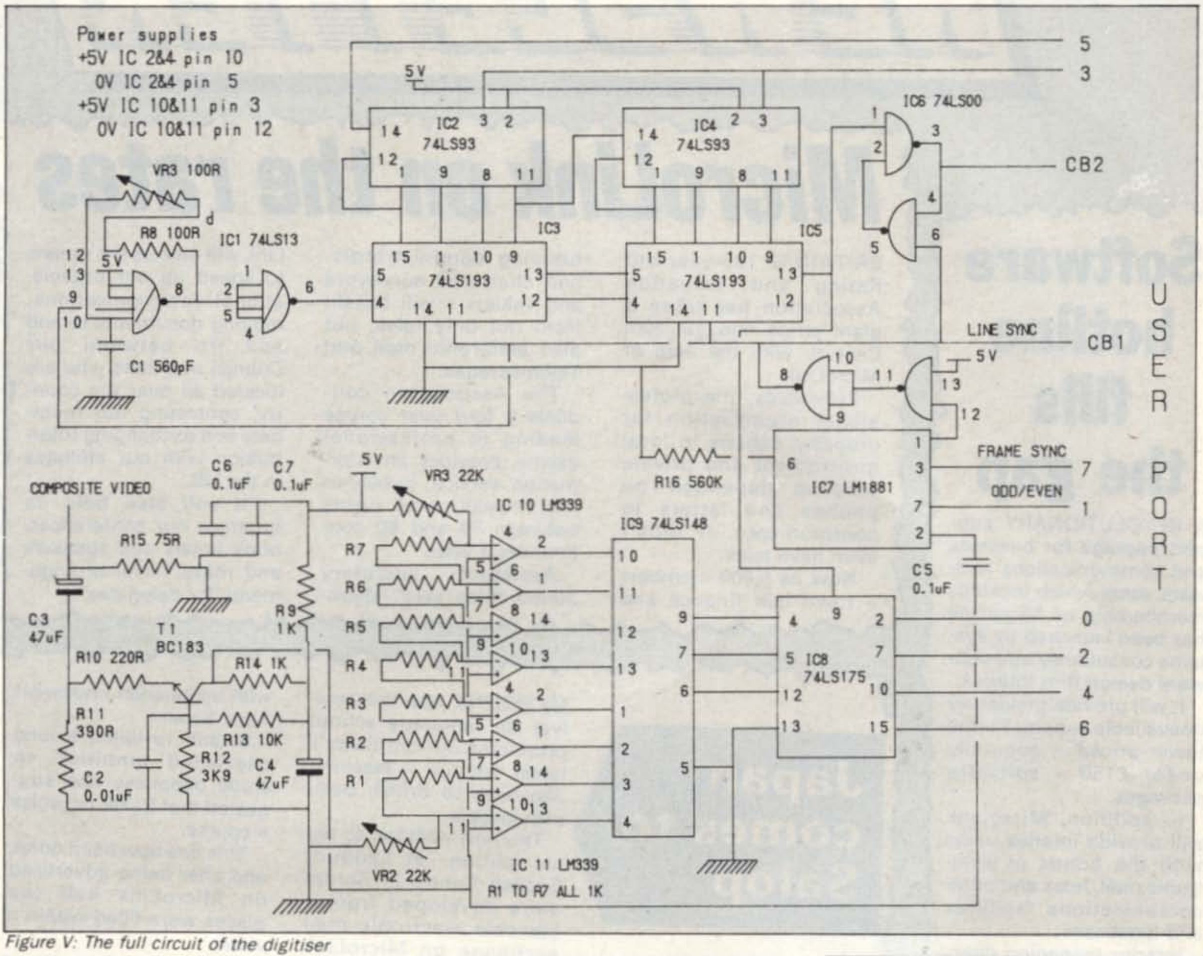
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IC7 LM1881
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C5 0.1uF
COMPOSITE VIDEO
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C7 0.1uF
R15 75R
C3 47uF
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R10 220R
R14 1K
R11 390R
R13 10K
R12 3K9
C2 0.01uF
C4 47uF
R9 1K
VR3 22K
IC 10 LM339
R7
R6
R5
R4
R3
R2
R1
VR2 22K
IC 11 LM339
R1 TO R7 ALL 1K
IC9 74LS148
IC8 74LS175
USER PORT
5
3
7
1
0
2
4
6

Figure V: The full circuit of the digitiser

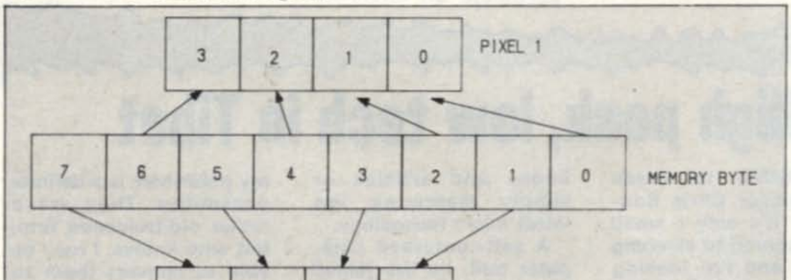
PIXEL 1
MEMORY BYTE
PIXEL 2
3
2
1
0
7
6
5
4
3
2
1
0
3
2
1
0

Figure VI: Mode 2 memory/pixel arrangement

◀ From Page 95

the other components, as Body Build Pack No.42 which you can order using the accompanying form.

The board needs to be attached to the user port with the Body Build standard cable available as Pack No. 2. You will also need a lead and socket to connect it to your video. This is not supplied, because different videos use different outputs.

The listing to drive this hardware will be given next month, along with ways of dumping the image on a printer and some image processing experiments you can perform with most digitisers.

In the meantime, those of you who would like to jump the gun can have a go at writing the software.

All that needs to be done is to wait until a frame sync pulse is received, then count the number of line pulses until the start of the frame and gather the data.

At the end of each frame increment the countdown value and repeat.

● *Well all right – I'll show you next month. Until then carry on digitising!*

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NEWSLETTER

Software hotline fills the gap

A REVOLUTIONARY support package for business and communications software users which includes membership of MicroLink has been launched by systems consultancy and software design firm Interlex.

It will provide previously unavailable support for the lower-priced – generally under £150 – software packages.

In addition, MicroLink will provide Interlex users with the bonus of electronic mail, telex and other comunications facilities and databases.

Interlex managing director Mike Lane said:"As the trend toward low cost hardware and software has gathered momentum, the traditional dealer network has moved upmarket.

"Consequently the bulk of new business micro users have been left totally unsupported because the High Street and volume sellers supplying them are not geared up for the task.

"Interlex will fill the vacuum by supplying support at a price the new generation of users can afford.

"Initially this will be provided through a telephone hotline, but we are pushing ahead with plans for an Interlex bulletin board on MicroLink to extend the service to comms users".

MicroLink on the rates

BRITAIN'S 105-year-old Rating and Valuation Association has taken a giant stride into the 20th Century with the help of MicroLink.

Previously, the professional organisation for property experts in local government and private practice depended on phones and letters to communicate. It didn't even have telex.

Now its 5,000 members – town hall finance and housing administrators, and chartered surveyors and valuers – will benefit from not only telex, but also electronic mail and Telemessages.

The Association conducts a four year course leading to professional exams, provides an information service, publishes text books, and holds between 70 and 80 conferences a year.

Assistant secretary Julian Price said:"MicroLink will give us the means to speed up our organisational communications, moving documents to and and fro between our Council members who are located all over the country, contacting our members and exchanging information with our affiliates in the US.

"It will also help us organise our conferences, book hotels and speakers and make travel arrangements for delegates".

Japan comes to Salop

MICROLINK was the catalyst for language school proprietor Duncan Baker's latest venture – teaching Japanese to British business people.

The new addition to the curriculum at Lydbury English Centre in Shropshire developed from a sociable electronic mail exchange on MicroLink with antiquarian bookseller Tony Swann.

Swann revealed a long cherished ambition to study Japanese and suggested that Baker organise a course.

This has now been done, and after being advertised on MicroLink half the places were filled within a week.

High peak, low tech in Tibet

ACCORDING to crack mountaineer Chris Bonington, "it's only a small trip compared to climbing Everest and I'm looking forward to coming home and getting to grips with MicroLink".

He was speaking a few days before leaving for Tibet, hoping to add the unconquered peak of Menlungste to his own collection of Himalayan "scalps".

When he's not climbing mountains Bonnington can often be found at a computer keyboard writing one of his numerous books and articles or simply mastering the latest micro technology.

A self-confessed computer buff, he has joined MicroLink because it will help him organise his expeditions.

"The telex facility will be absolutely invaluable in this respect", he said. "At present I have to rely on the generosity of my accountant and use his office telex machine if I want to send and receive messages, but obviously this isn't always convenient for either of us.

"Transmitting text to my publishers is a definite possibility. They are a rather old-fashioned firm, but who knows, I may be able to convert them to Email. As a newcomer to MicroLink I'm also looking forward to exploring its many sections just for the fun of it.

"Unfortunately I won't be able to use MicroLink to keep in touch with home while I'm in Tibet. Where I'm going is so remote that my messages will have to be carried by runner for three days before they reach the nearest road".

YOUR chance to join MicroLink – turn to Page 156

True, false – and in between

Pete Bibby takes another look at the logic behind conditional statements

LAST month we learnt how to get our programs to take decisions, using Basic's IF . . . THEN statement. This evaluates a condition to see if it's true and, if it is, performs a specified action.

Program I should jog your memory about how this works in practice:

```
   10 REM Program I
   20 INPUT "Enter a number " number
   30 IF number > 10 THEN PRINT "The num
ber entered is greater than 10"
```

That's all well and good. But as it is, if *number* isn't greater than 10 the program just stops. It doesn't tell us anything. Program II is an attempt to rectify this omission:

```
   10 REM Program II
   20 INPUT "Enter a number " number
   30 IF number > 10 THEN PRINT "The num
ber entered is greater than 10"
   40 IF number < 10 THEN PRINT "The num
ber entered is less than 10"
```

Here there are two IF . . . THEN statements. The first checks to see if *number* is greater than 10 and, if so, prints an appropriate message.

The second is found at line 40 and uses an IF . . . THEN to see if *number* is less than 10. If this is the case, the condition between the IF and the THEN is true and the rest of the line is obeyed. The result is that the program tells you whether *number* is less or greater than 10.

While in this case all you get from the comparisons is a message, it's not hard to see that in more complicated, practical programs the value of *number* could lead to more important actions.

For example, in a banking program *number* might be credit taken to be compared with a credit limit. Whether or not the limit is exceeded could determine further action.

Going back to Program II, have you noticed that it's got a flaw? It works well enough for values like 23 or 4 but what happens when *number* is 10? Try it and see.

You'll find that nothing happens. Neither message is printed as neither the condition in line 30 nor the condition in line 40 is true – 10 is neither less than 10 nor greater than 10.

Now this might have been meant to happen, but it's unlikely. The chances are that it is a programmer's error and that 10 wasn't meant to slip through the net. This, as we'll see when we deal with more complicated conditions next month, is all too easy to do. In this case it's easily remedied. You could patch the program with a line like:

```
50 IF number = 10 THEN PRINT "The number
 entered is 10"
```

or you could modify the program as shown in Program III:

```
   10 REM Program III
   20 INPUT "Enter a number " number
   30 IF number > 10 THEN PRINT "The num
ber entered is greater than 10"
   40 IF number <= 10 THEN PRINT "The nu
mber entered is less than or equal to 10
```

Here line 40 prints a message if *number* is less than or equal to 10: Line 30 takes care of the cases when *number* is greater than 10. Try it out with, say, 5, 10, 16, –12 and any other numbers that come to mind.

You'll find that whatever the value of *number*, an appropriate message is printed out. Nothing slips through: Everything is dealt with by the IF . . . THENs of either line 30 or line 40.

BEGIN
HERE
Part 17

Notice that one of the conditions is true while the other is false. Obviously *number* can't be both less than or equal to 10 and greater than 10 at the same time. The two conditions rule each other out – they're mutually exclusive.

Another example of this is a tossed coin, which can only land heads or tails, not both.

Bearing this in mind, take another look at Program III. When line 30 is reached, the condition is tested for whatever value is in *number*. Now if it's true, the condition in line 40 has to be false. Or if line 30's condition is false, then it's a certainty that line 40's condition is true.

Given this, it seems a waste of time having the two tests of *number*. All you really have to do is to perform the first test – the second is just the other side of the coin. If it's not heads, then you know it's tails without having to test for it.

With the test in line 30, if it's true you know that *number* is greater than 10 or else *number* is less than or equal to ten. Or to put it another way: IF it's true THEN you know that *number* is greater than 10 or ELSE *number* is less than or equal to 10.

The IF . . . THEN . . . ELSE principle for dealing with these all-or-nothing, either-one-thing-or-the-other cases has been built into BBC Basic and takes the form:

```
IF condition is true THEN perform
action 1 ELSE perform action 2
```

Program IV shows it being used. This does exactly the same job as Program III, only now there is one less line and so one less comparison for the micro to make:

```
   10 REM Program IV
   20 INPUT "Enter a number " number
   30 IF number > 10 THEN PRINT "The num
ber entered is greater than 10" ELSE PRI
NT "The number entered is less than or e
qual to 10"
```

What happens when the program is run depends on the value given to *number*. If it's greater than 10 the con-

Turn to Page 100 ▶

'IF you can answer that THEN well and good or ELSE . . .'

◀ *From Page 99*

dition between the IF and the THEN is obviously true. What happens now? With our simple IF ... THENs, whatever followed the THEN is obeyed. Now, however, we've got two actions, separated by an ELSE. Which gets performed?

The rule is that if the condition is true, the first action – the bit sandwiched between the THEN and the ELSE – is performed. Should the condition be false, in this case a *number* that is equal to or greater than 10, then the second action, the part found after the ELSE, is performed.

Suppose that number takes the value 45. Then the condition of line 30 is true and the action between the THEN and the ELSE is performed. The result is:

```
The number entered is greater than ten
```

appears on the screen.

If *number* had been, say, 4 then the condition would be false as 4 is certainly not greater than 10. Now the micro leaps over all the intervening code and just performs the bit after the ELSE. This results in:

```
The number entered is less than or equal
to 10
```

being displayed. Try running Program IV with various values of *number* until you understand what's happening. And then see if you can understand why changing line 30 to:

```
30 IF number <= 10 THEN PRINT "The numbe
r entered is less than or equal to 10" E
LSE PRINT "The number entered is greater
 than 10"
```

leaves the action of Program IV unchanged.

Program V, our last one this month, is just a fragment from a cricket scoring program – in principle it's exactly the same as Program IV. I leave you to try out various values for *score* and see if it does accurately report when a century has been made.

```
 10 REM Program V
 20 INPUT "Enter the score " score
 30 IF score >= 100 THEN PRINT "It's a
century ELSE PRINT "It's not a century"
```

And then can you alter it so that it also tells you if the score is a duck (0)? And what if the score is a silly one like –13? What then?

● *IF you can answer that THEN well and good or ELSE you'll find out next month when we look further into the ins and outs of IFs.*

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OPUS DDOS

Should you need an interface for your new drive, we can even supply you with our easy-to-fit Opus double-density disc operating system for the amazing price of just £40.00. Its super compatibility makes it the perfect partner for all BBC micro models and Master Series computers. The Opus DDOS handles tape to disc transfers and is equipped with the same 1770 disc controller chip as the BBC B+.

SALE HOTLINE—0737-65080

To guarantee your sale bargain post the coupon today or ring the Opus Sale Hotline on 0737-65080. Generous education and dealer discounts available on request.

To Opus Supplies Limited, 53 Ormside Way, Holmethorpe Industrial Estate, Redhill, Surrey.
Please rush me the following (PRICES INCLUDE VAT AND CARRIAGE).

__________ Single Drive(s) at **£69.95 each**

__________ Opus DDOS at **£40.00 each.** *(Only when purchased with drive)*

I enclose cheque for £ __________ or please debit

my credit card account with the amount of £ __________

My Access ☐ Visa ☐ no. is ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
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Watford Electronics

Acorn
The choice
of Experience

Jessa House, 250 Lower High Street, Watford WD1 2AN, England
Tel: Watford (0923) 37774-40588 Tlx: 8956095 Fax: 01 950 8989
BY POPULAR DEMAND OUR SHOP IS NOW OPEN UNTIL 8PM EVERY THURSDAY
All prices exclusive of VAT; subject to change without notice & available on request.

The choice after
Experience

Credit Card Orders (ACCESS & VISA) Tel (0923) 33383 or 50234 (24 Hours)

BBC MASTER 128K Micro	£395
BBC MASTER TURBO 4MHz	£493
512K Processor Add on Board "inc. Mouse and GEM package"	£195

BBC MASTER COMPACT

All Master Compact Microcomputers are supplied complete with an integral 3½" Disc Drive and various educational and professional bundled softwares.

System 1	Standard Package	£385
System 1A	System 1 + TV Modulator	£399
System 2	System 1 + Green Hires Monitor	£469
System 3	System 1 + Medium Res Colour Monitor	£599

SPECIAL OFFER

FREE . . . £80 worth of Software

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control and Computer Concepts' popular Interword wordprocessor ROM; WHEN YOU BUY YOUR BBC MASTER COMPUTER FROM US.

RS232 Kit for BBC Compact	£26
Additional 3½" for BBC Compact	£99
Turbo 65C102 Add-on Module	£99
BBC MASTER ET (Econet Terminal)	£315
Econet Module for the Master	£43
ROM Cartridges for Master	£13
Reference Manual I	(No VAT) £14
Reference Manual II	(No VAT) £14
Advance Ref. Manual	(No VAT) £19
64K Upgrade Kit for B+	£32
Acorn 1770 DFS Kit complete	£42
ECONET Upgrade Kit for BBC	£42
ALL ECONET UPGRADES Available	
6502 Acorn 2nd Processor package	£175
Z80 Acorn 2nd Processor package	£325
32016 Co-Processor	£999
Cambridge Workstation	£3450
ARIES IEEE Interface	£265
Acorn IEEE Interface Complete	£280
Acorn Teletext Adaptor	£95
Acorn Bitstick I	£299
Robocom Bitstick II	£759
Upgrade for Bitstick I to II	£450
Bitstick Multiplotter Driver	£65

(Securicor carriage £7)

CENTRONICS GLP & Brother M1009 (NLQ) Printers

A major price break-through in NLQ Printers from Watford.

At last, a low cost full feature printer, supplied complete with Watford's own NLQ ROM (separately at no extra cost). Due to Watford's bulk purchasing power and low margins we can now offer this incredible printer deal direct from the manufacturers to our customers.

Features include, Epson RX Compatible commands, Near Letter Quality print, 50 CPS Draft mode, Centronics parallel interface, Single, Double & Quadruple density graphics modes, Subscript & Superscript, handle up to 9½" wide standard paper, Friction Feed standard, Low cost Tractor feed optional extra, Bi-directional logic seeking.

Special Offer ***£95*** *(carr £5)*
Tractor Feed Attachment ***£12***

CO-PRO Adaptor

CO PRO ADAPTOR

Now for the first time you can add the Master Co-processor boards, to your standard BBC model B, or B Plus. With this brand new launch from Watford Electronics you can attach any BBC Master co-processor to the original BBC Micro. Once again Watford forges ahead with a new concept in BBC micro addons. This unique external Co-Pro Adaptor, is protected by patent applications.

Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor it supersedes.

With the 512K addon your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. This requires both the 1770 DFS and the ADFS to be fitted to your computer.

To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.

Master owners may use Co-Pro to add a second Co-processor externally.

Watford, brings power to your BBC at only:
£50.00 (carr £5)

VARIOUS PRINTERS

● EPSON FX800 Printer	£315
● EPSON JX-80 Colour Printer	£399
● EPSON Hi-80 Printer Plotter	£229
● Hi-80 Refils, set of 4 Pens	£6
● EPSON Paper Roll Holder	£17
● EPSON LX86 Printer	£199
● EPSON LX80/86 Tractor Feed	£20
● EPSON LX80/86 Sheet Feeder	£49
● EPSON FX800 Printer	£315
● EPSON FX1000 Printer	£439
● EPSON EX800 Printer	£405
● Colour option for EX800/1000	£55
● EPSON LQ800 Printer	£439
● Centronics Printer Cable to interface all the above Printers to BBC	£6

(Securicor carriage charge on printers £7)

PRINTER SHARERS

(Ideal for School environment)

Connect 3 BBC Micros to 1 Printer	£60
Connect 6 BBC Micros to 1 Printer	£99
PRINTER CHANGER	
Connects 3 Printers to 1 Micro	£65

(Cables extra)

Acorn-Olivetti JP101 Spark Jet Printer

One of the main problems with most printers is that they are hopelessly noisy. How often have you wanted to print something late at night but not done so for fear of waking the children? Also ideal for those working in quiet environments such as libraries, etc. Silence the complaints with the serious solution from Watford at the amazing cost of only **£59**

Accepts standard 9½" Paper.

Pack of 4 refills **£10**

JP101 accepts 9½" standard fan fold paper or single A4 sheets. Tractor & Friction feed supplied as standard – print speed 50 cps.

SPECIAL OFFER

EPROMs for BBC's Sideways ROMs.

2764-250nS £2.50
27128-250nS £2.75

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

6264LP (8K) £2.80
2 × 6264LP (16K) £5.50

KAGA/TAXAN PRINTERS

(IBM/Epson compatibles)

Kaga KP815 Printer	**£269** (carr £7)
Kaga KP915 Printer	**£369** (carr £7)
RS232 Interface	£49
RS232 Interface with 2K Buffer	£69
RS232 Interface with 1K Buffer	£89

RX & FX PRINTER INTERFACES

Epson interfaces fit inside the printer to allow connection using techniques other than Centronics.

RS232	£27	RS232 + 2K Buffer	£55
IEEE 488	£65	RS232 & 8K Buffer	£75

PRINTER LEADS

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

Standard length (4 feet long)	£6
Extra long (6 feet long)	£8
Compact's Special Centronics Lead	£9
RS232 Cable	P.O.A.
IBM Parallel 1 metre Cable	£12

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
BBC Micro	–	£3.50
BBC Master	–	£4.00
Brother HR15	£3.00	-
FX100	£7.00	£5.25
FX80-MX80-FX85	£4.50	£4.95
RX80	£4.50	£4.50
LX80	£4.00	£4.50
GP80	£4.50	£4.00
GP100-GP250	£5.95	£3.95
Centronics GLP	£4.00	£3.75
KAGA KP810	£5.25	£4.75
CANON PW1080	£5.25	£4.75
Panasonic KX1080	£7.75	£4.75
Microvitec Metal Monitors	–	£5.50

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Listing Paper (Perforated)

1,000 Sheets 9½" × 11" Fanfold Paper	£7
2,000 Sheets 9½" × 11" Fanfold Paper	£12
1,000 Sheets 15" × 11" Fanfold Paper	£9
Teleprinter Roll (Econo paper)	£4

Carriage on 1,000 Sheets £1.50

PRINTER LABELS

(On continuous fanfold backing sheet)

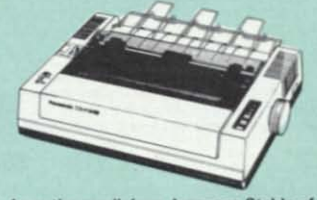
1,000	90 × 36mm (Single Row)	£5.00
1,000	90 × 36mm (Twin Row)	£4.90
1,000	90 × 49mm (Twin Row)	£7.50
1,000	102 × 36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00

NEW

Panasonic KX-P1081

(Now IBM Compatible)



from the prodigious Japanese Stable of Panasonic comes this fabulous new NLQ Dot Matrix Printer

Available NOW at a superbly realistic price, the KX-P1081 perfectly balances features, quality of construction and Value for Money to produce the printer of tomorrow, here today, ready to sweep the current generation of machines away.

Ingenious innovation in terms of software control codes permits great flexibility when it comes to defining the print style. A nippy 120 cps of clear Draft text backs up the crisp 24 cps Near Letter Quality text mode, with upto 40 superbly useful downloadable characters. A delightful range of assorted character widths is efficiently supported, with sizes ranging from a broad 5 cpi to petite 17 cpi, EVEN in NLQ mode. Some of the extensive support for serious use includes specialised functions to perform justification, centering and even left and right ranging. Proportional spacing permit even greater freedom when it comes to advanced use. Not only is the full Epson RX compatible contròl code set implemented, but extra codes have also been added to cater for the NLQ options, etc.

A full 96 ASCII character set is supported, with an extended set of 32 international characters and IBM special characters as well as IBM block graphics characters. A 1K Print Buffer alleviates much of the wait time normally associated with printing, whilst the bi-directional logic seeking print head takes the quickest route to print as required.

The draft text is implemented with a 9 × 9 matrix, with Near Letter Quality effected by means of an 18 × 18 matrix.

(Price inludes, FREE A 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

Special Price: **£149** (carr. £7)

Panasonic RS232 Interface: **£39**

Panasonic KX-P1092 Dot Matrix Printer

Similar to KX-P1081 but has 180cps speed, Draft/NLQ down loadable characters option and is IBM/Epson compatible.

Price £345

Panasonic KX-P3131 Daisy-Wheel Printer

A few months ago, we introduced the KX-P1080 to our large and discerning customer base. As a result of the enthusiastic and overwhelming reaction to this versatile dot matrix printer (see above for details), we are now extremely pleased to be able to bring you details of the fabulous KX-P3131 Daisywheel Printer, also from Panasonic. The KX-P3131 printer is the ideal printer for the home user wishing to produce clear, immaculate letters or reports.

Ideally suited to the pocket of the home user, costing not much more than a pair of disc drives, this daisywheel printer delivers flawless text at 10, 12 or 15 characters per inch. It also supports proportional print mode.

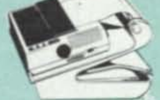
Printing at a respectable 17 characters per second, the KX-P3131 features a capacious 6 kilobytes printer buffer to swallow most printing requirements with ease. For the more demanding user, there is a 32 kilobytes printer buffer option available. Taking paper up to 13.5" wide, the KX-P3131 prints with bidirectional logic seeking, ensuring the minumum time to print your text.

Only **£218** (carr. £7)

Single Sheet Feeder	**£195**
Tractor Feed	**£90**

NEW

YU-S25 Printer Stand



This new printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

Special Introductory Offer

Only £29

We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop. All Monitors are supplied complete with connecting lead.

MICROVITEC 14"

● 1431 – Medium resolution as used on the BBC television computer programme	**£175**
● 1451 – High resolution, suitable for word processing in mode 0	**£225**
● 1441 – High res, exceeds the capabilities of the BBC micro	**£359**
● 1431AP RGB + PAL and AUDIO	**£199**
● 1451AP RGB + PAL and AUDIO	**£255**
● Dust Cover for Microvitecs	**£5.50**

KAGA-TAXAN 12"

● KAGA KX1201G Hi-res Green Monitor	**£85**
● KAGA KX1202G Long persistence Hi-Res Green Monitor	**£93**
● KAGA KX1203A Ultra-Hi-Res Amber Monitor	**£93**
● KAGA Vision 2 Hi-res RGB Colour monitor. Ideal for Wordprocessing	**£260**
● **Kaga Super Vision 3,** Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue	**£309**
● 12" Anti-Glare Screens	**£9.50**

PHILLIPS 14"

- Hi res Colour Monitor with facilities for AUDIO OUT and switch for Hi res Text display in Green. Recommended for user with BBC Master Series Computer by Acorn Computers Ltd.

Only £229

ZENITH

"Test Bureau Recommended for use in Education"

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith PC Systems.)

Green (New Design) Hi-res	**£69**
Amber (New Design) Hi-res	**£74**

LEADS

BNC Lead for Zenith or Philips	**£3**
Skart Monitor Lead	**£5**
RGB lead for KAGA	**£3**

N.B. carriage on Monitors **£7** (securicor)

SWIVEL BASES

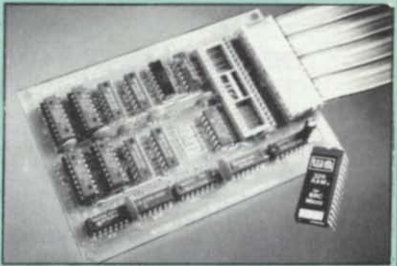
for Video Monitors

By placing your monitor on one of our superb swivel bases, you gain the freedom to adjust the monitor viewing angle to suit your needs. By doing this, you alleviate eye strain and reduce back stress.

for 12" Monitors **£10** (carr. £2.50)
for 14" Monitors **£14** (carr. £2.50)

32K

SHADOW RAM-Printer Buffer Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

● IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

● "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

● In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

● Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

● Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

● Ensure COMPATIBILITY with a vast range of hardware (including our ROM board, the ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS, Music 500's AMPLE). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable and has the power consumption of a couple of ROMs!

● Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages, and a comprehensive manual is supplied free.

● Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

See next page for SPECIAL OFFER

Only £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

Continued →

INCREDIBLE WORD PROCESSING DEAL ! ! !

Watford Electronics, already renowned for quality products at discount prices, are offering, the truly spectacular BARGAIN OF THE YEAR!

A Watford's 32K Shadow RAM Card – Printer Buffer and the much sought after, Computer Concepts' Inter-WORD, (a very powerful package) All this at an astounding price of:

Only £89 (carr £2)

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED (BOOK)

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, Canon PW1080A or any Epson FX80 compatible Printer with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

Superb Value at **£5.95** (No VAT)

NOW WITH EXTRA FEATURES AT NO EXTRA COST Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

If you already have the Watford Electronics DFS and wish to incorporate these new facilities ten simply return your existing DFS ROM to us together with £5 remittance for an upgrade. Please pack the ROM securely and address the package to our Upgrades Dept.

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for four years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).***

PRICES

Complete Disc Interface Kit including DFS ROM and fitting instructions	**£62**
Acorn's 0.90 DFS Kit complete	**£57**
DFS Manual (Comprehensive) (no VAT) *(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs).*	**£6.95**
Watford's sophisticated DFS ROM only	**£16**
We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only	**£12**
DNFS ROM only **£17** ● *ADFS ROM only* **£25**	
Watford's DFS is exclusively available from Watford Electronics and their appointed dealers only. Every ROM carries a special label with LOGO and serial number.	

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these! Operates both in Single & Double Density modes.

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

Complete DDFS Kit incl. fitting instructions	**£46**
DDFS Manual (no VAT)	**£6.95**
We will exchange your existing Single Density DFS Kit for our DDFS Unit at	**£29**

BBC MICRO BUSINESS/ WORD/PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). Please telephone or call in at our retail shop to discuss your particular requirement and a demonstration.

EXAMPLE PACKAGE

BBC Master 128K Micro, View wordprocessor, Viewsheet, Basic Editor, Terminal Emulator, Twin 800K 40-80 track double sided Disc Drives, Zenith Hi-Res green monitor, Panasonic KX-P3131 professional quality Daisy Wheel printer, Gemini Database, Spreadsheet, Beebplot Graphics, Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements, and Stock Control packages on disc with manuals.

Only £899

A Low Cost wordprocessing package: Same as above except, a single disc drive instead of a twin and Olivetti Spark Jet Printer instead of Panasonic.

Only £625

MYSTERIES OF DISC DRIVES & DFS REVEALED (BOOK)

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

EXTENDED WARRANTY

Now Available
For BBC, Masters, Disc Drives & Monitors.
Write or phone for further details

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket. **£4**

NEW MARK II LIGHT PEN + PENPAL 2

The Watford Electronics Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.

Penpal II, Watford Electronics' sophisticated light pen software is also supplied free on cassette or disc (please specify). This is a highly sophisticated drawing package enabling you to gain the maximum benefit from your Light Pen. The software is used to edit Mode 2 full colour screens using lines, patterns and you own designs. Screens may be saved to cassette or disc.

Price Only £15

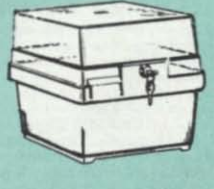
FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

£8

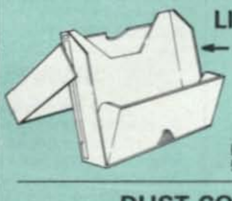
ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection –
Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

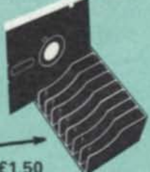


M35 - holds upto 50 discs	**£8**
M85 – holds upto 95 discs	**£10**
M50 – holds 50 3½" Discs	**£10**

PLASTIC LIBRARY CASES



Holds up to 10 5¼" Discs. **Only £2.00**



DX-08: Holds up to 8 5¼" Discs while in use **Only £1.50**

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) ***£3.20***	Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95**	Twin CD (with PSU) **£3.90**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our drives are of Japanese manufacture. All our 80 track drives are already fitted with a 40-80 select switch.

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

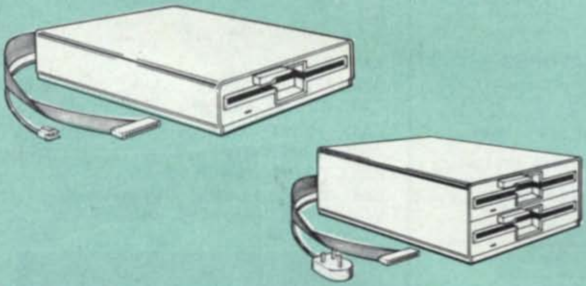
Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below for single drives is for a single drive in a standard single case. Single drive in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 10th page of our advert for the Plinths).
P.S. All our 5¼" Disc Drives are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect 3½" and 5¼" Disc Drive to BBC Compact £13



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £95		CS 200 £108	
400K (720K)	CLS400S £96	CLD 400 £180	CS 400S £109	CD400 £200
800K (1.44M)		CLD 800S £183		CD 800S £204

- TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £5 to £6

Prefix ***C*** *= Cased Drive*
L *= Less PSU*
S *= Single*
D *= Double*

Suffix ***S*** *= 40-80 Switchable*

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40-80 track).

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

● *10 × 5¼" S/S D/D 40 Track Diskettes*	***£10***
● *10 × 5¼" D/S D/D 40 Track Diskettes*	***£12***
● *10 × 5¼" S/S D/D 80 Track Diskettes*	***£15***
● *10 × 5¼" D/S D/D 80 Track Diskettes*	***£15***
● *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT*	***£30***
● *10 × 3½" S/S D/D 40/80 track Discs*	***£18***
● *10 × 3½" D/D D/D 40/80 track Discs*	***£22***

TOP QUALITY 3½" & 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

● *10 ×* ***M3*** *3½" D/S D/D 80 Track Discs*	***£20***
● *10 ×* ***M4*** *5¼" S/S D/D 40 Track Discs*	***£9***
● *10 ×* ***M5*** *5¼" D/S D/D 40 Track Discs*	***£11***
● *10 ×* ***M7*** *5¼" D/S D/D 80 Track Discs*	***£14***
● *3" Double Sided Discs*	***£3*** *each*

Special BULK OFFER on 5¼" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£46	£49	£72
● With Sleeves	£49	£52	£75

ACORN WINCHESTER DRIVES

Suitable for direct connection, via the 1MHz bus, to any BBC running ADFS. These Acorn Winchester disc drives are fast and extremely reliable. Each Winchester comes complete with the Level III Econet File Server software.

10 Megabytes **£1050; 30 Megabytes £1549**

WATFORD's WINCHESTER DRIVES

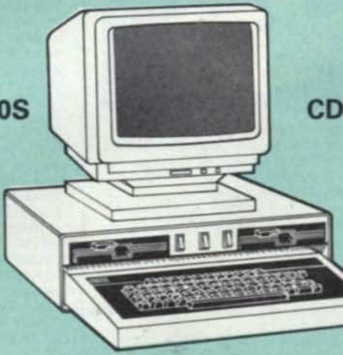
● 20 Megabytes with ADFS	**£635**
● 40 Megabytes with ADFS	**£999**

WINCHESTER WORKSTATION

20 Megabyte Winchester, plus a Tape Streamer and a 400K Floppy Drive all housed in a plinth with cooling fan **£1499**

CDP 800S

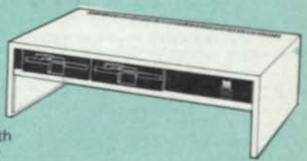
CDPM 800S



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £210 **CDPM 800S for Master £225**
(Securicor Carr. £7)

ACORN'S Twin 800K Disc Drives



Specially mounted side by side in a Master Plinth. Supplied complete with Manual and Cables. Plugs directly to the Master Computer.

RRP £250 **Our Price: Only £199** (carr £7)

EPSON NLQ ROM
for the BBC Micro

Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM **£7**

THE NLQ DESIGNER

(The First & still the Best)

SPECIAL OFFER this Month:
Supplied with over 25 Different fonts

A massively useful utility for users of the Taxan/Kaga KP810/910 or the Canon PW1080. This program allows you to define NLQ character sets to download into the printer's memory. Full on screen editing of the font. Requires 6264 RAM chip to be fitted in the printer.

Supplied with disc containing over 25 example fonts. Please specify 40 or 80 track. Fonts are: Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print and Gothic etc. (P.S. This ROM is not suitable for Epson printers.)

- *NLQ Designer ROM & FONT Disc* ***£25***
- *Kaga Individual FONT ROMs* ***£10***

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics. Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- *Vertical and horizontal scaling in all graphics modes and mode 7*
- *Rotation of image by 90, 180 or 270 degrees*
- *Left hand margin setting*
- *Screen dump window setting*
- *Colours appear as grey scale*
- *Two tone fast dump*
- *Colour mask*
- *Mode 7 contrast expansion*
- *Mode 7 contiguous dump*
- *Key triggered and User Port triggered dumps*

The Micro User Feb. 1985.
'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten''.

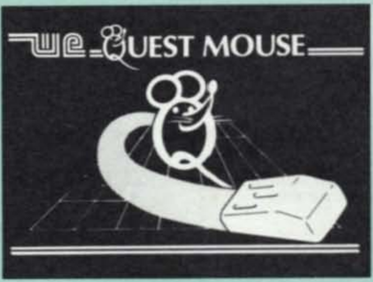
For use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1080, Mannesman Tally and compatibles.

Only: £25

(Write in for further details on all above ROMS)

NEW



QUEST MOUSE

The ultimate in Mouse technology, the Watford Electronics Quest Mouse. This package must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist looking for the most powerful drawing program around.

The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that programs such as AMX Pagemaker etc. will work with it. The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford Quest Paint software and so that worn out mice can be replaced for minimum cost.

The Mouse features high resolution 50 PPI operation. It has a rubber ball for maximum accuracy and has three buttons to allow a massive range of options to be accessed without touching the keyboard.

QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard. The software is carefully designed to provide all the features needed by the budding artist. It is the nearest we can get to using paintbrush, airbrush, pencil and rubber on your computer screen.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. For a full leaflet describing the software in full detail please write to us.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, dither pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or centre spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size change. Trace round areas of colour. Zoom for fine editing. Compatible with screens from Watford Beeb video digitiser. Load and Save screens with colour palette information, save brush and pattern definition etc.

SPECIAL INTRODUCTORY OFFER

QUEST MOUSE & QUEST PAINT	**£59**
QUEST MOUSE ONLY	**£35**
MOUSE MATS	**£5**
QUEST PAINT SOFTWARE	**£34**

(Quest Paint supplied complete with Software in a 32K ROM, User Guide and Utility Disc)
(PS. The Watford Quest Mouse is FULLY Compatible with the AMX Mouse, therefore all AMX Software will work perfectly with it)

By popular demand our retail shop is now open until 8pm every Thursday

NEW MEGABUFFER 256

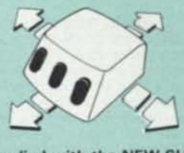
This new Megabuffer 356 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Low Cost, High performance.
- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

Only £99 (carr £2)

THE AMX MOUSE



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £63 (carr £1.50)
(Please specify for BBC or Master Computer)

We are giving away, absolutely **FREE**, our popular Colour Art software package worth **£15** with every AMX Mouse package purchased from us.

AMX MAT	**£5**
AMX MOUSE ONLY	**£35**
AMX DESK Package	**£19.00**
AMX UTILITY Package	**£11.00**
AMX SUPERART Package	**£39**
AMX PAGE-MAKER Pack Best desk-top publishing software. Works with keyboard, joystick and AMX Mouse	**£32**

We are giving away, absolutely FREE, PAGE-FONTS, a disc containing over 20 fonts, with every purchase of AMX PAGE-MAKER from us.

PAGE-FONTS Over 20 fonts for use with AMX PAGE-MAKER	**£9.50**
EXTRA EXTRA	**£19**
AMX 3D ZICON Disc	**£19**
AMX Database Disc	**£19**
AMX XAM Educational	**£19**
AMX MAX(A gem of desktop (ROM)	**£17**

RB2 MARCONI TRACKER BALL

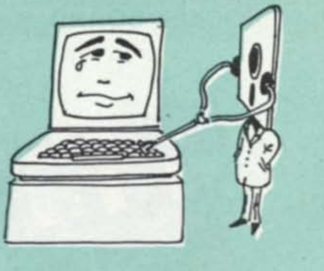
This popular unit is supplied complete with software.

Price: **£59**

FLEET STREET EDITOR

Software pack **£35**

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

BBC Publication's Popular Educational Software

● Maths with a Story 1 (Cassette). 4 primary level maths programs	£10.95
● Maths with a Story 2 (Cassette) 4 further maths programs	£10.95
● Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs	£19.95
● WAVES: Science Topics (Disc) CSC O Level Physics program.	£14.95
● RELATIONSHIP: Science (Disc) O Level Biology program.	£14.95
● BONDING: Science (Disc) O Level Chemistry program.	£14.95
● ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program.	£14.95
● ELECTRONICS IN ACTION (Disc) O Level program	£14.95
● NEWTON & THE SPACE SHUTTLE (Disc) O Level program.	£20
● ECOLOGY (Disc) O Level program.	£20
● POLYMERS (Disc) O Level program.	£20
● Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule.	£20
● FOOD & POPULATION (Disc) O Level program.	£20
● MICROTECHNOLOGY (Cassette) O Level program.	£6.95
● A VOUS LA FRANCE (2 Cassettes) A French language home study aid.	£17
● DEUTSCH DIREKT! (Disc & Audio Cassette)	£20

TED

The Teletext Editor Package for serious users

TED is the brand new package from Watford Electronics for the editing and creation of teletext (Mode 7) screens and displays. TED is ideal for anyone wanting to create their own Mode 7 pictures (such as game title pages), designing animated displays for shop windows, exhibitions, classrooms, etc. TED is also probably the most powerful Prestel screen editor you will ever come across.

Supplied on a special 32k package, full facilities are providing for manipulating the screen, including easy to use pixel manipulation; line, column and block buffering and copying; left and right margins; large text in a variety of different fonts (contained within the ROM device); various borders and effects templates (contained within the ROM device); line and column insertion and deletion; easy to use graphics line drawing. Those are some of the features of editor itself. In addition to this, TED contains routines for taking a number of Teletext screens and creating them into an animated sequence, with user selectable display times, repeats on a group of shows, various entry methods (how the picture is put onto the screen), routing selection (both predefined and keyboard specific), chaining of other shows, etc. Scrolls treat the Teletext sequence as a very long page with a window onto it. Supplied complete with a comprehensive manual. There are many more facilities not mentioned here, so write in for a comprehensive leaflet; you'll wonder how you managed without TED.

Price: £35

ROM-SPELL

"way ahead of any competition"

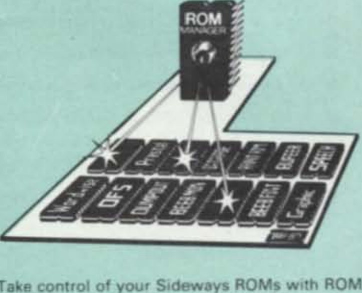
ENGLISH DICTIONARY
ROMSPELL

Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.

NOT compatible with 1770 DFS.
(Please state 40 or 80 track disc)

Price still only: £25

ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.

"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

NEW

THE EUREKA CARD

(The Unique RAM Expansion System)

The Eureka Card is Watford's latest and most sophisticated RAM expansion system. Using advanced PAL based technology this card is a breakthrough in RAM systems for the BBC micro. The Eureka Card provides the user with around 58K of free memory in Basic, VIEW and WORDWISE PLUS. You also get Shadow RAM from within the active language. No other RAM expansion system can match that!

Load up to 58K long Basic programs. Texts in VIEW and WORDWISE PLUS up to 58K as well. This with absolutely NO loss of speed in accessing your text or program. Eureka consists of a card containing 64K of program memory, two parallel banks of sideways RAM and some extremely complex switching circuitry. This is all controlled by Eureka's highly sofisticated software supplied in ROM. Designed to a very high specification, this board is fully buffered to give reliable operation under virtually any circumstances.

The Eureka board plugs into the 6502 socket and has NO messy flying leads. It is compatible with many other products from Watford, such as our Solderless ROM Board and our ROM/RAM Board. All in all, the Eureka Card is an amazing board. Jump into the age of serious data processing with a Eureka Card! Please write in for further details 'on advantages the Eureka can offer you'.

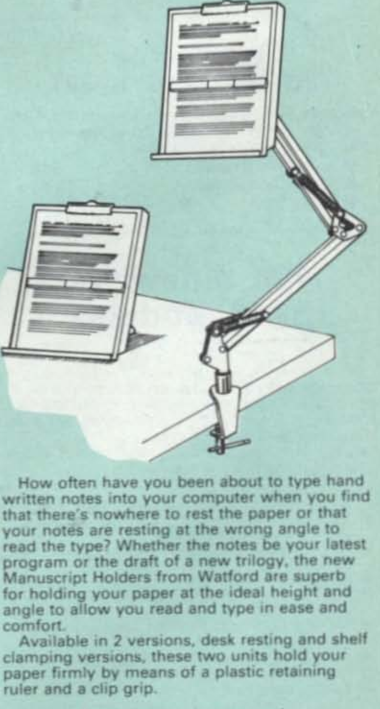
Introductory price: Only **£89** (carr £3)

(P.S. Eureka is only suitable for a standard model B; it normally replaces any Shadow RAM cards present. Some speed degredation does occur with filing system access. Eureka cannot be used at the same time as a second processor).

BEEBMON

The most powerful machine code monitor for the BBC Micro **£24**.

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

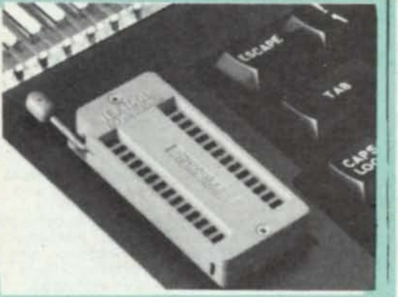
Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip.

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£14** (carr. £3)

All prices in this advert are exclusive of VAT.

Continued →

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

- The low profile of the socket allows unrestricted access to the Keyboard.

- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

- BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack.

● Complete System	**£11**
● Spare Cartridges	**£2.50**
● Spare Rack	**£1.50**

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

16K DISC RAM

Unlike other RAM boards, this revolutionary, battery backed up, write protectable 16K sideways RAM board allows you to run from disc every sideways ROM available.

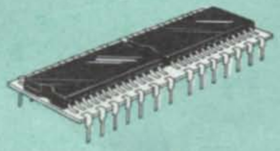
Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £32 (carr £2)

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

SOLID STATE 16K SIDEWAYS RAM



This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead terminating in a mini hook-on probe, to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. ***Compatible with BBC B Plus.*** Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28** (carr 2)

Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

Do you find the 16K Sideways RAM Units confusing? If so, we have compiled this quick questionnaire to help YOU decide which is the best one for you. If the answer to any of the questions is yes, then use the index number to select from the boards below. Options in brackets indicate possible secondary choices.
Do you require:

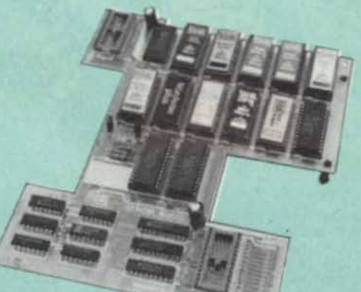
- Sideways RAM for a BBC B+ Choose 1, 2 or 3.
- Sideways RAM for the B+? Choose 3.
- A small, basic module? Choose 3.
- A sideways RAM module for a ROM board? Choose 1 or 3.
- An easy to use utilities disc(Choose 1, 2 or 3.
- More than one module installed at once? Choose 1 or 3.
- To use sideways RAM as a printer buffer? Choose 1 or 3.
- Battery Backup? Choose (1) or 2.
- Write protect for RAM (makes ROM look like RAM)? Choose (1) or 2.
- Read protect (allows recovery from crashes)? Choose 1.

Key:
1) 16k Sideways RAM Module
2) 16k Disc RAM
3) Solid State 16k Sideways RAM

GRAPH PAD 2

Supplied complete with Software
£60 (Carr. £3)

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

NEW

The BBC B+ Micro ROM EXPANSION BOARD

Specially designed for all BBC Plus users, this board sits in an external box, and will accept either 10 off 16k EPROMs, OR 10 off 32k EPROMs.

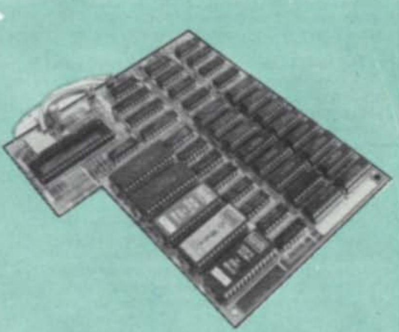
With the 32k EPROMs, only 5 can be 'online' at once (that's all the B+ can address, as each chip 'holds' two normal sockets worth), but you can swap between the two banks if necessary. With the 16k EPROMs, you can obviously address them all at once. An extra card can be added to permit 2 banks of 10 EPROMs to be used (again with only one bank available at once).

The ROM box, which has its own mains power supply, and connects to the BBC Plus via a specially designed card (which is a buffered card for your peace of mind) permits easy access to the EPROMs via the hinged lid. NO soldering is required for this board.

£79 (carr £2)

Watford ROM/RAM CARD

A must for all serious users



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

● *ROM/RAM card with 32k dynamic RAM*	***£39***
● ROM/RAM card with 64k dynamic RAM	***£52***
● ROM/RAM card with a massive 128k dynamic RAM	***£80***

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

● *16k plug-in Static RAM kit*	***£6***
● *16k Dynamic RAM for Upgrade*	***£7.50***
● *Battery backup*	***£3***
● *Read and Write protect switches*	***£2** each*
Complete ROM-RAM board (all options installed)	***£89***

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***
- *BT Approval applied for.*

(When ordering, please specify the version required, (BBC or Master)

SPECIAL OFFER

Price: **£74**
(carr £3)

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Nightingale Modem

SPECIAL PRICE to our Customers

£85

(Price includes: Nightingale Modem, Commstar ROM pack & Comprehensive manual)

Nightingale Modem without software	**Only £75**
COMMSTAR ROM package only	**£29**
(P&P on modem £2.00)	
Auto Dial Utilities Disc	**£9.50**

APOLLO

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution - Buy a Watford APOLLO!

Special Launch Price: **£75**
(Carr £3)
(Write in for full specification)

BT TELEPHONE CONNECTORS

LJU 1/4A Mini Line Master	**£4.50**
LJU 1/6A Mini Line Slave	**£3.00**
LJU 2/4A Line Master	**£4.00**
LJU 2/6A Line Slave	**£2.50**
LJU 3/4A Flush Master	**£3.95**
LJU 3/6A Flush Slave	**£2.75**
LJU 10/3A Dual Splitter	**£5.50**
4 Way BT Plug	**£0.75**

Versatile **BEEB SPEECH SYNTHESISER** Unit

Beeb Speech Synthesiser

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£48
CARETAKER Basic Utility	£25
DISC DOCTOR	£28
Graphics ROM	£23
TERMI	£25
COMMUNICATOR	£49
SPEECH ROM	£24
Printmaster	£24

Wordwise

£24

Wordwise plus

WORDWISE PLUS
£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC:	**£5**

SPELL MASTER
Only: £49

Inter SHEET ONLY £37

INTER-CHART ONLY: £26

Inter-WORD

Only: £42

Special Discount price for the existing Wordwise Plus owners. Simply quote your reg. number and pay.

Only: **£39**

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	**£37**

VIEW 3.0 ROM

Price: Only **£54**

HI-VIEW (for use with 6502 2nd Processor)	**£36**
VIEW Printer Driver Generator Please specify Disc or Cassette)	**£9**
VIEWSHEET (Acornsoft)	**£37**
VIEWSTORE	**£37**
VIEWSPELL with 80 track disc	**£29**
VIEWPLOT Disc	**£22**
VIEW-INDEX	**£12**

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP	**£10**
Juki & Brother HR15	**£10**
Silver Reed Printers	**£10**

ADVANCED COMPUTER PRODUCTS

Adv. Disc Toolkit	**£29**
Adv 1770 DFS for Mast/Compact	**£29**
Adv 1770 DFS for BBC/BBC+	**£29**
Adv Disc Investigator	**£24**

MINI OFFICE II (disc)	**£14.50**

REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

النور

ARABIC ROM
for the BBC Micro

The ALNOOR ARABIC ROM converts your BBC into a bilingual computer. New keytops provide both English and Arabic symbols. Two sets of Arabic symbols are provided for use in either context sensitive or insensitive operation.

20, 40 and 80 column operation. Compatible with ASMO (449). English-Arabic printer interface software. Numeric entry from either left or right of number. Communications software to send or receive 7 or 8 bit data.

Different shapes of Vowels (e.g. Shadda, Fatha, etc). Different shapes of Hamza. Full English and Arabic character sets with all special characters.

£85

(Price includes Alnoor ROM, Operating Manuals & a full set of Arabic/English Keytops)

VIEW PRINTER DRIVER ROM

(Professional facilities for demanding users)

View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

Access
VISA

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234-33383

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!

ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8
P.S. This includes the Acorn 6502 & Z80.

A give away at . . . **Only £29**

Please specify 40 or 80 track disc when ordering.

ARIES CORNER

Aries B-32
Shadow RAM Card

18 months of intensive research and development have produced a worthy successor to the widely acclaimed Aries-B20: the revolutionary Aries-B32. This 'second generation' expansion board features 32k of RAM and a 16k ROM socket.

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: B-32 **£80** (carr. £2)

Aries B-12
Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries B-20 and the Aries B-32. For the business user or educationalist, the compact and secure internal fitting is ideal, with the ROM board tucked neatly inside the lid where it will not cause overheating problems. The serious software developer and the hobbyist may prefer to mount the board externally, giving instant access to the sockets for experimental purposes. A zero-insertion force (ZIF) socket may be fitted to the board to enhance this mode of operation.

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable 'mother board' which carries the extension ROM sockets and a small 'base board' on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have an B32 or B20, a small adaptor module (the Aries B-12C) is available at a nominal cost. The 6264 static RAM chips used to provide the sideways RAM are advertised elsewhere in our advert.

Price:
Aries B-12 **£40.** Aries B-12C **£5**

THE ARIES RANGE HARDWARE REQUIREMENTS

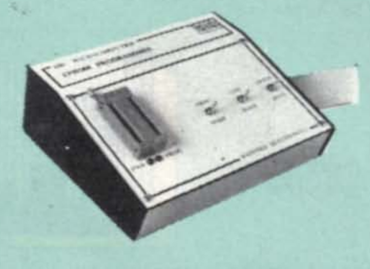
Aries B-32 & BBC B, MOS 1.20, hardware plugs into CPU socket.
Aries B-12 & BBC B, MOS 1.20, hardware plugs into all four sideways ROM sockets and connects to the B32 or the B20. The adaptor Aries B-12C module is necessary where these are not fitted.
Aries B-488 BBC B, MOS 1.20, Hardware plugs into 1MHz Bus.

ARIES B-488
IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

Aries B-488 Unit: **£238** (Carr £3)

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette-disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

SPECIAL OFFER £69 (£3 carr.)

TEX EPROM ERASERS

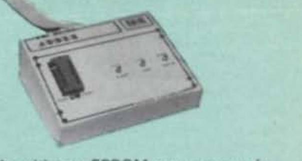
EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234-33383

NEW

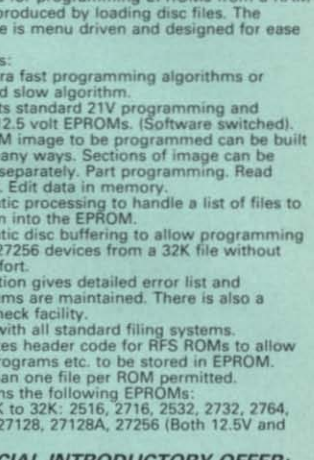
ADDER



Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.
Features:
Two ultra fast programming algorithms or standard slow algorithm.
Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
Automatic processing to handle a list of files to program into the EPROM.
Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
Works with all standard filing systems.
Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM.
More than one file per ROM permitted.
Programs the following EPROMs:
From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

SPECIAL INTRODUCTORY OFFER:
£65

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£20** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£25** (carr £2.00)

Continued ⟶

BOOKS (No VAT on Books)

15 Hrs Word Processor Using BBC	£3.95
30 Hour BASIC (BBC Micro)	£7.95
40 Best machine Code Routines	£7.95
6502 Assembly Language Program	£19.95
6502 Application	£11.95
6502 Assembly Lang. Subroutines	£19.95
6502 Development System	£7.50
6502 Machine Code for Humans	£7.95
6502 Reference Guide	£9.95
68000 Assembly Lang. Programming	£19.95
68000 Machine Code Programming	£13.00
68000 Programming the	£22.95
6809, Programming the	£16.95
Art of Music Graphics	£14.95
A User Guide to Wordwise Plus	£9.95
A Young persons Guide to BBC Basic	£5.95
Advanced Disc User Guide	£16.95
Advanced BASIC ROM User Guide	£9.95
Advanced User Guide for BBC	£15.95
Advanced Graphics with BBC	£9.95
Assembly Language Programming on BBC Micro	£11.50
Adventure into BBC BASIC	£6.95
Applied Assembly Lang. for BBC	£9.95
Assembler Routines for the 6502	£7.95
Assembly Language Programming FOR the BBC Micro	£8.95
Assembly Language Programming on the BBC & Electron	£8.95
Basic ROM User Guide	£11.95
Basic User Guide for BBC Micro	£10.00
BBC B Compendium	£5.95
BBC B+ User Guide	£14.95
BBC BASIC for Beginners	£7.95
BBC Forth	£7.50
BBC Hardware Projects	£8.95
BBC Micro & the small Business	£5.75
BBC Micro ROM Book	£10.95
BBC Master 128 High Flyer	£10.95
BBC Micro Advanced Ref. Guide	£10.95
BBC Micro Disc Companion	£8.95
BBC Micro File Handling on	£6.95
BBC User Guide	£10.00
BBC Software Projects	£6.95
BBC Wordprocessor Beginners Guide	£7.95
BBC Within the Micro	£13.95
BCPL User Guide	£14
Complete FORTH	£6.95
CP-M-86 User's Guide	£19.95
CP-M Bible	£16.50
CP-M Handbook with MPM	£9.95
CP-M Plus Handbook	£13.95
CP-M Soul of	£16.50
CP-M The software BUS	£8.95
Creative graphics on BBC Micro	£7.50
Disc Drive Projects for Micros	£5.45
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Disc Programming Techniques	£9.95
Disc System for the BBC Micro	£6.95
Exploring FORTH	£6.95
FORTH on the BBC Micro	£7.50
Functional Forth for the BBC Micro	£5.95
Guide to BBC ROMs	£9.95
Graphs & Charts on BBC Micro	£7.50
Hackers Handbook - New	£6.95
Interfacing & Robotics on BBC	£15.95
Introduction to COMAL	£9.50
Introduction to LOGO	£6.95
Introducing 'C'	£9.95
Introducing LOGO	£5.95
Introduction to FORTH	£8.95
Introduction to PASCAL	£17.95
ISO-PASCAL Reference Manual	£9.95
LISP 2nd Edition	£14.95
LISP, A Beginners Guide to	£10.95
LISP the Language of Artificial Intelligence	£9.95
Logo Programming	£9.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering Assembly Code	£8.95
Mastering CP-M	£17.95
Mastering Music	£6.95
Mastering the Disc Drive	£7.95
Master Advance Reference Manual	£19.95
Master Reference Manual Part 1	£14.00
Master Reference Manual Part 2	£14.00
Micronet Handbook	£6.95
Points of View	£6.95
Programming the 6502	£16,95
Programming the Z80	£19.95
Structured Basic	£7.95
Structured Prog. with BBC BASIC	£6.50
The Complete FORTH	£6.95
The Epson FX-KAGA PRINTER Commands REVEALED	**£5.95**
Turtle Graphics on BBC Micro	£7.50
Using Floppy Discs with BBC Micro	£5.95
View 3.0 User Guide	£10
View Guide	£4.50
Viewsheet User Guide	£10
Viewstore User Guide	£10
Using BBC Basic	£4.95
Wordprocessing BBC Beginners Guide	£7.95
Wordstar & CP/M made easy	£7.45
Wordwise + A User Guide	£9.95
Z80 Applications	£15.95
Z80 Assembly Language Programming	£19.95
Z80 Reference Guide	£9.95

OFFICE MASTER

Office
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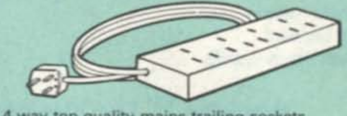

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SINK THE BISMARCK

'Sink The Bismarck' is the first of a new generation of wargames for the BBC Micro with disc drive. The game is split into several sections, each of which is loaded from disc when required.

'Sink The Bismarck' simulates the conditions in the North Atlantic in May 1941, as the British Home Fleet was despatched to catch and destroy Bismarck. But with a dozen troop and supply convoys in the Atlantic, time was of the essence. You must also consider the strengths and weaknesses of each of your ships, weather, U-boat attacks and fuel limitations.

"Sink The Bismarck has the perfect balance between pure strategy and an arcade game."
Micro User January 1987

"If you've never tried a warfare simulation before them may I suggest that this would be a good place to start? Well designed, playable and good value for a disc-based game."
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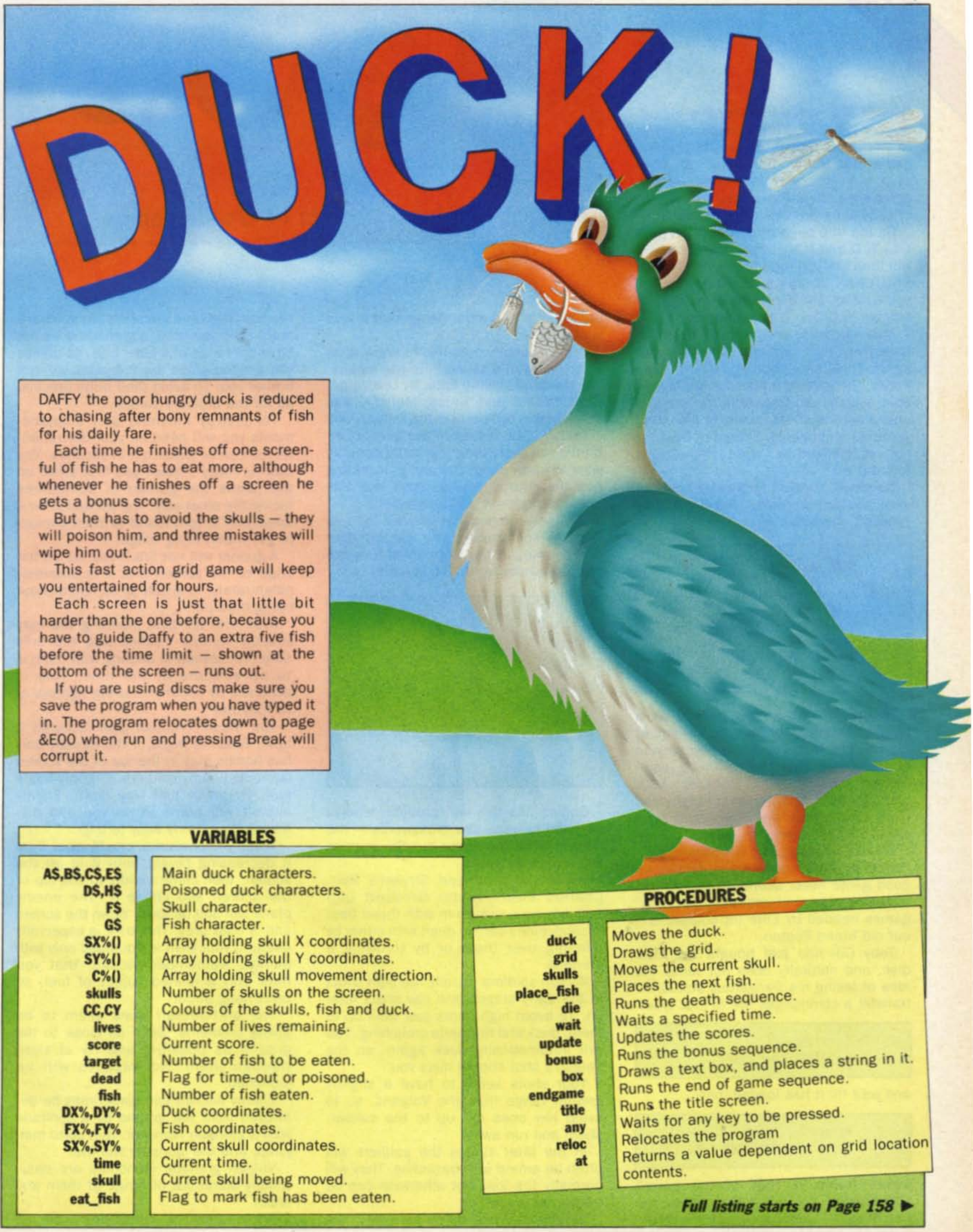
DUCK!



DAFFY the poor hungry duck is reduced to chasing after bony remnants of fish for his daily fare.

Each time he finishes off one screenful of fish he has to eat more, although whenever he finishes off a screen he gets a bonus score.

But he has to avoid the skulls – they will poison him, and three mistakes will wipe him out.

This fast action grid game will keep you entertained for hours.

Each screen is just that little bit harder than the one before, because you have to guide Daffy to an extra five fish before the time limit – shown at the bottom of the screen – runs out.

If you are using discs make sure you save the program when you have typed it in. The program relocates down to page &E00 when run and pressing Break will corrupt it.

VARIABLES

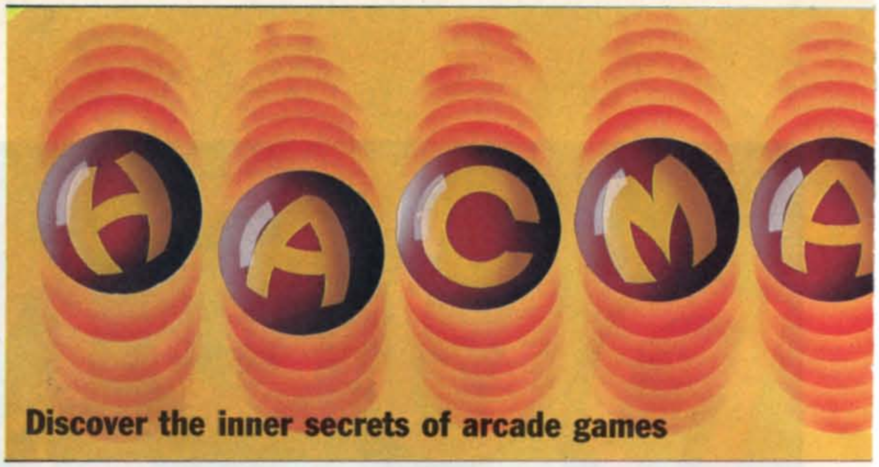
A$,B$,C$,E$	Main duck characters.
D$,H$	Poisoned duck characters.
F$	Skull character.
G$	Fish character.
SX%()	Array holding skull X coordinates.
SY%()	Array holding skull Y coordinates.
C%()	Array holding skull movement direction.
skulls	Number of skulls on the screen.
CC,CY	Colours of the skulls, fish and duck.
lives	Number of lives remaining.
score	Current score.
target	Number of fish to be eaten.
dead	Flag for time-out or poisoned.
fish	Number of fish eaten.
DX%,DY%	Duck coordinates.
FX%,FY%	Fish coordinates.
SX%,SY%	Current skull coordinates.
time	Current time.
skull	Current skull being moved.
eat_fish	Flag to mark fish has been eaten.

PROCEDURES

duck	Moves the duck.
grid	Draws the grid.
skulls	Moves the current skull.
place_fish	Places the next fish.
die	Runs the death sequence.
wait	Waits a specified time.
update	Updates the scores.
bonus	Runs the bonus sequence.
box	Draws a text box, and places a string in it.
endgame	Runs the end of game sequence.
title	Runs the title screen.
any	Waits for any key to be pressed.
reloc	Relocates the program
at	Returns a value dependent on grid location contents.

Full listing starts on Page 158 ►

Part 3



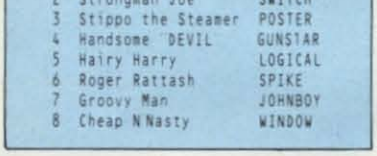
Discover the inner secrets of arcade games

BEFORE WE tackle this month's biggie, Stryker's Run, here are a couple of pokes to whet your appetites. Justin Condon has written in from Co.Dublin with news of a built-in cheat facility for Audiogenic's excellent Psycastria – Just type *FX231,0 before CHAINing the game.

On the title page press down the keys I, L, T, D and N together. The computer will then ask you for a password. Type in SHOTOKAN. When you play the game the score panel will show nine lives, but the number appears to be unlimited.

Afterwards the program will revert to three lives, so simply enter the password again. Thanks to Justin and also to Gary Partis, the game's author for his invaluable assistance. Gary tells me there is also a built-in cheat facility in his latest game for Audiogenic, Sphere of Destiny, not yet released as I write. Has anyone found it yet?

Darren Munson of Colchester has sent in all the passwords for The Big KO! by Tynesoft. They are:

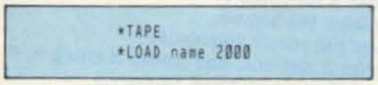


```
1 Heap Big Nose        START
2 Strongman Joe        SWITCH
3 Stippo the Steamer   POSTER
4 Handsome 'DEVIL      GUNSTAR
5 Hairy Harry          LOGICAL
6 Roger Rattash        SPIKE
7 Groovy Man           JOHNBOY
8 Cheap N Nasty        WINDOW
```

In the last issue we published a number of pokes for the tape version of Commando. If you have the disc version of the game type the following commands: *LOAD DGAME, ?&6D26=&60, and CALL&6D00. Enter any of the pokes from last month's column and type CALL&2300 to start the game.

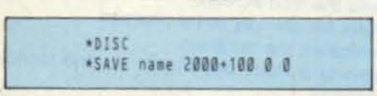
It is a surprising, and to software publishers no doubt encouraging, fact that a good game never seems to die. I keep receiving tips and requests for "old" games headed by Elite (of course) and our old friend Repton.

Toby Gill has just bought the Elite disc, and naturally does not fancy the idea of losing his Dangerous status. To transfer a commander file to disc type:



```
*TAPE
*LOAD name 2000
```

and wait till it has loaded then:

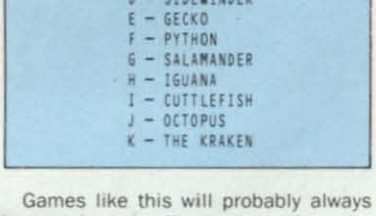


```
*DISC
*SAVE name 2000+100 0 0
```

where name is that of the saved commander. You will have missed the first mission – destroying a stolen ship – but a better and more dangerous one is yet to come.

Daniel Doran would like to know what all the data in a saved Elite file means. The Guide to playing Elite, by Lee Varga, Clive Packer and Stuart Menefy, was published in two parts in the January and February 1986 issues of *The Micro User*. It tells you everything you could possibly want to know about the game, including how the data is stored. Don't use it to cheat though – it spoils the fun.

Daniel Wood has just finished the first Repton. For anyone who missed their first showing in *The Micro User*, here are the passwords for all 11 screens:



```
A - SCREEN ONE
B - CHAMELEON
C - TERRAPIN
D - SIDEWINDER
E - GECKO
F - PYTHON
G - SALAMANDER
H - IGUANA
I - CUTTLEFISH
J - OCTOPUS
K - THE KRAKEN
```

Games like this will probably always be popular as – like crosswords – the idea may be the same but the puzzles are always different.

So to the promised Stryker's Run. Charles Ewan, Ander Grossett and T.Veitch have written in with these tips:

Land mines can be dealt with either by jumping over them or by throwing a grenade.

Volgan soldiers usually fire high shots in the early stages and low shots later on. To avoid high shots just walk up to them, duck and fire while crouching. You will automatically duck again, so the Volgan's shot should miss you.

Your shots seem to have a slightly greater range than the Volgans, so to avoid low ones run up to the soldier, shoot and run away.

In the later stages the soldiers will often be armed with bazookas. They will normally fire low, but otherwise can be treated as above.

Volgan captains throw grenades and fire both high and low shots. As you have probably discovered, a grenade does not have the range of a laser bolt, so unless you get too close the grenades will not bother you. To avoid their bolts proceed as for the ordinary soldier.

To destroy machine gun emplacements you will need all your discretion, as you can be wiped out in seconds. You may be lucky – when you first arrive on the scene the gunner is sometimes facing the other way. The second or so it takes him to turn round is often enough to get within firing range.

A gunner will not fire if you are on the edge of the screen and it is possible, albeit rarely, to sneak up on him without being fired on.

Even with the best planning you may sustain serious injuries and the only sure fire method of dealing with them is to be airborne at the time. This is achieved by commandeering fighters or helicopters.

The Master version also features a tank. When in flight, if the aircraft only has bombs stay at the top of the screen bombing enemy soldiers. If it only has a gun, fly about half way down. Enemy aircraft will home in on you and this makes them fairly easy to trap.

When you encounter one fly away from it decreasing height until it is off the screen, then climb rapidly to the top of the screen and chase it. The enemy plane will still be lower down the screen and is easy prey. This trick is especially useful if your craft is equipped only with bombs. Remember though, that you have only a limited supply of fuel, so don't hang about.

The anti-aircraft guns seem to be giving problems. Skim as close to the ground as possible and fly straight through them: No missiles will be launched.

Enemy aircraft can sometimes be destroyed from the ground by a comrade with a grenade launcher. Run up to him, jump, and the launcher will fire.

Volgan grenade launchers are easy. Simply stand out of range of them and shoot.

Try to resist the almost overwhelming

temptation to liven things up by bouncing along instead of walking. As you can't fire mid-jump you're a sitting duck for whatever may appear at the right hand side of the screen.

Let the allied soldiers do the fighting for you – that's what they're there for. Also, whether you are travelling by foot, aircraft or tank, it is better to make a quick attack and hurried retreat a few times over, than to wade in blindly with all guns blazing.

Just try out-shooting a machine gun!

Miss C.Caswell is finding difficulties with the initial nine lives. I hope my extra lives routine, Listing I, for disc users will suffice. I haven't included an infinite lives facility as this would defeat the point of the game.

As yet I haven't an equivalent routine for the cassette version. Can anyone oblige?

The Stryker's Run package includes a version designed to take advantage of the Master's extra facilities. It includes multi-channel music, enhanced graphics and a scrolling message saying how many pizzas it took to write the game.

Good though the 32k version is, the added features of the 128k version are simply breathtaking.

The extra graphics – a single feature may be wider than the screen – are so astounding that any detail also found in the 32k version looks mediocre by comparison. To any ardent games player the game is a good reason in itself for upgrading to a Master.

If, like for myself, a Master is but a distant dream, a solution is at hand. A humble model B with the Solidisk Fourmeg 256k sideways ram board can give you the extended version.

This routine (Listing II) comes courtesy of Adrian McLeod of Leytonstone. It once again relates to the disc version, but as the use of sideways ram virtually necessitates a disc drive, almost everyone using this routine should have the disc version. (Once again – can anyone help the cassette users?)

For good measure Adrian has included a similar extra lives poke. This is well worth trying out, as you invariably lose your nine lives long before seeing what you get for the extra program code.

Adrian's routine works on the Solidisk board on both the two and four meg settings. If any of you can modify it for use with other sideways ram boards please drop me a line.

For extra lives on the Master itself type in Listing II with the following modifications:

```
50A%=4:B%=5:C%=6:D%=7:HIMEM=&D00:*FX15,1
60*SRLOAD data1 8000 4 Q
70*SRLOAC data2 8000 6 Q
80*SRLOAD data3 8000 7 Q
90*SRLOAD data4 8400 5 Q
```

Run this program instead of using Shift+Break on the original disc.

Last, but by no means least, to show that Master Compact owners are entitled to their share of the fun, Listing III provides an extra lives facility for the enhanced game. A special thank you to Mr.Nimmo of Chesham for the loan of his Compact. Nice keyboard, shame about the interface . . .

As a parting shot, does anyone have any tips for the game that has been my favourite for many months now – Geoff Crammond's instant classic, Sentinel?

Upgrades

Listing I: Stryker's Run. Extra Lives 32k

```
   10 REM extra lives for 32k Stryker's
 Run (disc version)
   20 REM by Hac Man 1987
   30 REM (C) The Micro User
   40 oscli=&FFF7:L%=9:REM change L% to
 the required no. of lives (1-127)
   50 FORI%=0TO2STEP2:P%=&900:[OPTI%
   60 LDX= cli1 MOD 256:LDY= cli1 DIV 25
6:JSR oscli
   70 LDX= cli2 MOD 256:LDY= cli2 DIV 25
6:JSR oscli
   80 LDA=&60:STA&9B4:STA&1EC6
   90 JSR&1E71:JSR&970
  100 LDA=L%:STA&2465:\ no. of lives
  110 JMP&576F
  120 .cli1 EQUS L.S.game +CHR$(13)
  130 .cli2 EQUS L.S.setscr +CHR$(13)
  140 ]:NEXT
  150 CALL&900
```

Listing II: Stryker's Run. 256k version

```
   10 REM Master Stryker on B with Sol
idisk 256K RAM
   20 REM by Adrian McLeod
   30 REM (C) The Micro User
   40 IFPAGE<>&A00THENPRINT Set PAGE to
&A00 and retry. :END
   50 A%=8:B%=9:C%=&A:D%=&B:HIMEM=&D00:*
FX15,1
   60 ?&FE32=A%:*L.data1 8000
   70 ?&FE32=C%:*L.data2 8000
   80 ?&FE32=D%:*L.data3 8000
   90 ?&FE32=B%:*L.data4 8400
  100 CLS:INPUT  Enter lives (1-127):
L%:IFL%<1ORL%>127THEN100
  110 */SCREEN
  120 *L.GAME
  130 ?&9FD=&18:?&9FF=&46:?&9B4=&60:CALL
&970:*T.
  140 FORI%=&1C87TO&1C9D:?I%=A%:NEXT
  150 FORI%=&1C9ETO&1CB6:?I%=C%:NEXT
  160 FORI%=&1CB7TO&1CC8:?I%=D%:NEXT
  170 ?&286B=A%:?&2962=A%:?&2ACF=B%:?&31
76=A%:?&37AD=B%:?&4B25=A%
  180 ?&2B1B=L%
  190 FORI%=0TO&3CE0STEP4:I%!&E00=I%!&18
00:NEXT:CALL&412E
```

Listing III: Stryker's Run. 128k Master Compact

```
   10 REM extra lives for 128K Stryker's
 Run (Master Compact version)
   20 REM by Hac Man 1987
   30 REM (C) The Micro User
   40 *KEY0*SRL.data1 8000 4 Q|M*SRL.dat
a2 8000 6 Q|M*SRL.data3 8000 7 Q|M*SRL.d
ata4 8400 5 Q|M*L.GAME2|MCA.&900|M
   50 L%=9:REM change L% to the required
 no. of lives (1-127)
   60 FORI%=0TO2STEP2:P%=&900:[OPTI%
   70 LDA= cont MOD 256:STA&1FA9:LDA= co
nt DIV 256:STA&1FAA
   80 LDA=&A9:STA&21A3:LDA=1:STA&21A4
   90 JSR&1F00
  100 .cont LDA=L%:STA&211B:\ no. of lives
  110 JMP&412E
  120 ]:NEXT:*FX15,0
  130 PRINT Insert Stryker disc and pres
s any key.. :G%=GET:*MOUNT
  140 *FX138,0,128
```

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Your technical questions answered by MIKE COOK

PROBLEM SOLVED

Voltage supply

NO ONE here in Kenya seems to know the answers to the following questions, so could you please help me.

I would like to use a BBC Model B bought in the UK with a Torch twin disc drive bought in the United States. Will the 110 volt, 60 Hz mains supply cause problems?

I would like to upgrade the ram from its present 32k to 256k, possibly using the Solidisk Fourmeg 256k board and add a 10Mb Winchester. Is this compatible with the Torch?

Does anyone make an AZERTY (French) keyboard for use with the BBC Micro?

Do you know whether a firm exists which can copy Osborne-formatted (WordStar) discs on to Torch-formatted discs?

You may be interested to know that *The Micro User* sells for KShs 100 in Nairobi. The exchange rate is KShs 24 to the pound – and yet you still have your faithful readers, myself included. — **Martin Sharman, Nairobi, Kenya.**

● *The 100 volt power supply will cause you problems. You will have to fit another power unit (these are quite separate from the drives) or get a step up transformer. The frequency difference will have no effect.*

I assume that in speaking of the Torch you mean the twin disc drives with Z80 second processor. If you are then there is no way you can utilise the extra ram from any expansion. If you run a Torch Z80CP/M system then you do not really have a BBC Micro.

It is possible to add a Winchester drive providing the software filing system it uses is configured properly. Tell any supplier what you want to do first.

I have not heard of anyone using a French keyboard with the BBC Micro. However, if you can get hold of one with a serial output you can simply plug it into the serial input port.

The only word processors with genuine accents capability I know of are designed for the Apple Macintosh.

For transferring between different CP/M formats like the Osborne try Grey Matter, 4 Prigg Meadow, Ashburton, Devon, TQ13 7DF, England. They most certainly will be able to do it.

Sticking keys

I WAS very pleased to see in the March 1987 issue of *The Micro User* that you have reverted to your original Problem Page feature, albeit under a slightly different heading – much more convenient to find than bits here and there.

However, in your reply to Mr. Harper's sticking keys problem, I would advise caution in the use of switch cleaner on any plastic parts, as the solvent (often trichlorethylene or dichloroethane based) attacks many commonly-used plastics, such as polystyrene, ABS, and their derivatives.

I tried a spot of R.S. switch cleaner on a broken keyswitch from a BBC Micro keyboard, and it promptly dissolved – as the label on the tin warns.

Should a keyswitch ever require replacing, I would strongly advise that it be removed and taken or sent to the stockist of your choice, as I was informed that there are no less than seven different patterns in use, none of which are interchangeable.

I have still not got an exact replacement for my laboratory's computer yet, so be warned. – **A. Elliott, Luton, Beds.**

● *Your last point about the difficulty of getting a replacement seems to underline my view that if possible you should try to repair it yourself.*

I am aware that some brands of switch cleaner will attack the plastic found on some types of keys. However, a degreaser like isopropal alcohol (IPA) or carbontetrachloride can be used on most keys.

I would most strongly agree with you that you must always test the effect of solvents on plastics before using them.

Einstein compatibility

I HAVE recently bought a Tatung Einstein computer for £150 from Dixons. The main reason for buying it was that it included a colour monitor which was compatible with my BBC Model B+.

The Einstein also has a built in 3in disc drive. On further investigation I found that it was easily removable, along with the power source.

Is there any way that I can convert the disc drive to work with my BBC Micro?

I'm pleased to get a colour monitor for £150 and would be over the moon to get a disc drive thrown in as well. Also it would be a cheap source for other BBC Micro users.

Keep up the good work. – **Gary Henderson, Derby.**

● *First the good news is that a 3in disc drive may be used like any 5.25in drive and the connector is the same. To use it on your B+ you just need the DFS rom and the disc controller fitted and a standard cable.*

But the bad news is that 3in discs are regarded as an obsolete format. They are expensive and getting increasingly harder to find. For a time they were not in production but now I hear that one manufacturer has started up again.

Loose connections

I RECENTLY installed a 65C102 co-processor in my Master, which works most of the time. However, on any given evening I never know if it will be available or not.

This evening my premonition was right and when I configured the Master for 'TUBE' I got the dreaded line of garbage across the screen and a totally disabled keyboard. I have learned to keep hammering at the keyboard for a good part of the evening, because with luck eventually use of the keyboard is restored so that I can configure 'NOTUBE' and carry on without the wayward co-processor.

If I risk another attempt to bring on the Tube the best I can achieve is usually the standard messages at the top of the screen but without 'Acorn MOS'. All very curious. Even more curious is that the next evening the co-processor may function as normal. – **J.G. Campbell, Ellon, Aberdeen.**

● *There is an old maxim: "When in doubt give it a clout". Your problem is no more mysterious than a loose connection. As you say continual bashing at the keyboard can rectify the fault. This is causing small shock waves to travel through the computer and make the intermittent connection.*

Try removing and refitting the co-processor board to get it seated correctly. It is possible that a spring contact on the board is weak and the connector will have to be replaced.

Teletext receiver port

I AM interested in your teletext receiver for a BBC Model B, but which port does it use? My Opus Challenger disc drive is on the 1MHz bus and repeatedly changing the connection bends the pins. Does anyone know of a 2-pole 34-way change over switch with D-fittings? – **J. Schafer, Haywards Heath, Sussex.**

● *The teletext receiver does plug into the 1MHz bus. If you have other devices in this connector it is posible to fix another insulation displacement socket on to the same cable, thus allowing you to have several devices connected to this port.*

The only proviso however is that they must respond to different address locations. If both manufacturers have kept to the rules then they will.

Turn to Page 120 ▶

Your technical questions answered by MIKE COOK

PROBLEM SOLVED

Double density

I HAVE a BBC B with Acorn 1770 DFS version 2.26, which is supposed to operate in double density. I cannot get it to MFM mode, only the FM mode. Please could you help me? – **Tim Hughes, Holywell, Clwyd.**

● *It is little wonder you can't get the Acorn 1770 DFS to work in the double density mode because it won't. The chip itself is capable of working in double density but the DFS software and the electronics surrounding the chip are not.*

Acorn used the 1770 as a replacement for the difficult to get 8271 and has tried to make it as compatible as possible with its predecessor.

Identical twin?

I HAVE in my possession a Penny and Giles Intelligent Mouse. From the outside it is identical to the photographs of the Megamouse advertised in your magazine.

I wonder therefore if you could tell me what connections to the 20-way IDC plug I should make so as to be able to utilise this mouse via the user port and if this is possible. – **Jeff Hawkins, Gwehelog, Gwent.**

● *I'm sorry but there is not enough information here to tell me if it is compatible. I do not know whether the signals are in the form of direction and pulse or anti phase pulses.*

However, you could try the following connections to the user port:

Green CB1
Yellow CB2
Purple D0
Blue D2
White D5
Orange D6
Pink D7
Black 0 Volts
Red +5 Volts

If it does not quite work try swapping the two X connectors or the two Y connections or the switches. The Body Building article in the July 1986 issue of The Micro User *gives a full explanation.*

Registering input

PLEASE can you tell me how to register input on the user port? I am building a small trolley with infra-red sensors. I know how to control the output, but I don't know how to connect the sensors to the user port so that the computer knows where it is.

How could the computer tell if either the left or right sensor is detecting I/R or both sensors are detecting I/R? – **A.P. Hamilton, Swindon, Wilts.**

● *The first thing you need to do is to get the signals from your sensors as a logic signal – zero volts when it is in one state and greater than 3.5 volts when in the other state.*

Without knowing the sort of sensor you have it is difficult to show exactly how but the figure below is a good starting point. You can get the voltage supply from the user port, then connect the output to an input bit on it.

Use bits 0 and 1 and make these input by writing a 1 in the VIA's data direction register with:

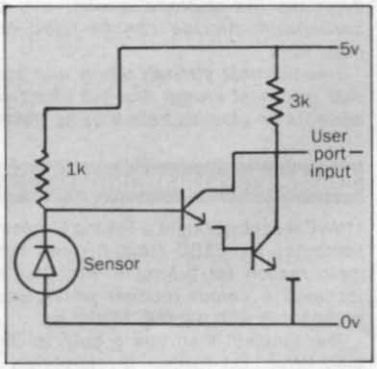
```
?&FE62=3
```

Then read the sensors with:

```
S%=?&FE60 AND 3
```

The variable S% will have the value 1 or 2 if just one sensor is on, 3 if both are on and 0 if both are off.

You can make an easy connection to the user port by using Bodybuild pack 1 (a transition board at £9.99) and Pack 2 (the connecting cable at £8.99). Both are available from Musbury Consultants at the address given in the Body Building article of this issue.



Printer maintenance

I HAVE an Epson MX80 printer that has suddenly developed a fault. The top row of dots is a lot fainter than the others – what can I do? – **A. Pratt, West Grinstead, Sussex.**

● *Funnily enough I had the same problem on my printer a few weeks ago. The first thing to do is to take the printer apart and test the Darlington drivers. These sometimes go slightly faulty so that one may not kick the needle as hard as it should.*

Disconnect the print head and test the resistance across each device; if it is the same for all devices then test the resistance of the coils in the print head. If they are all the same then your print head must be bunged up with ink. Try to clean it with a solvent, but be sure to use one that will not attack the plastic.

If all else fails you can try to dismantle the needles in the print head to make cleaning easier. This is a very delicate and tricky operation but I managed to do it on my printer.

Sound advice

CAN YOU tell me why my BBC Micro has recently developed a rasping bleep when switched on? Apart from this it continues to work normally, and I have not noticed any other changes.

This change in switch-on tone may be coincidental with the recent addition of a rom. – **W.D. Rubidge, Westbury-on-Tyne, Bristol.**

● *Fitting a sideways rom can change the start-up tone. This is because each rom has the opportunity of performing some initialisation routine and often this seems to alter the nature of the tone.*

The other possibility is that you have physically damaged the speaker by breaking the cone. If the sound continues to work perfectly I would not worry about this.

Cable fault

I HAVE an Epson P40 printer connected to my BBC Model B via a parallel interface and have always been happy with it – until recently that is.

I had not used the printer for some months and when I finally got round to wanting to print a listing all I got was rubbish. Regardless of what it is asked to print, it comes out with the same sort of thing every time.

I have checked all leads, DIP switches and so on, and the printer itself seems okay since it works correctly on self test. Could it be something in the software of my BBC Micro that has gone awry? – **Paul Watson, Wisbech, Cambs.**

● *If it was working some time ago and now it is not the prime suspect must be the lead.*

You say you have checked this but you do not say how. Most insulation displacement connectors are not as reliable as one would like them to be. The act of flexing a lead is enough to make or break the contacts so testing with a continuity meter is difficult.

There is nothing in the software of the computer that could have gone wrong, however, it is possible that the 74LS244 printer buffer or the 6522 VIA is faulty but this is unlikely.

Try the printer with the same cable on another computer to give yourself the final assurance, but I am sure this is a cable fault.

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by
The Mad Hatter
10/6

Surviving the Ice Age in Lords of Time

OVER the year I have been running this column, I have been interested to see how some of the earliest adventures for the BBC Micro have stood the test of time. One, forgive the pun, is Lords of Time. I still get queries from people stuck at various points in this game.

Written by Sue Gazzard, coded by Level 9, Lords of Time was the first adventure I came across which had the multiple section format. You have to explore nine different temporal zones in order to defeat the evil Lords of Time.

Each time zone has items in it which are of use somewhen else in the game. The following is a commentary on time zone two: The Ice Age. It will be of particular help to John Mausolas of Athens and uses a similar technique to the one in the January issue.

In Lords of Time the clock is the place to store potentially valuable items, and saves at this position just before you think of entering a new time zone are essential.

On arrival in the Ice Age it soon becomes clear that a way of keeping warm is the first thing you must look for, otherwise death from cold follows swiftly.

Soon after realising that, I found a pile of wood and a woolly mammoth nearby which would not let me proceed any further.

Thinking a bonfire might be the answer to keeping warm, I started again at the clock and brought the matches along, but I could not light the wood with them.

I then decided to live dangerously. I started once more, and included the can of petrol (found in the contemporary age) this time.

I hoped the bonfire would warm up the Ice Age temporarily at least. I poured the petrol on the wood, lit a match and whoosh! Not only did the bonfire ignite, but the woolly mammoth was so startled that it jumped out of its skin. There was my warm fur coat.

Exploring further, I found a meaty bone. On a bit more, and a sabre tooth tiger emerged.

My cat likes a bone as much as the dog does. I suspect Siamese cats think they are dogs, so I tried the bone on the sabre tooth pussy . . . no good.

Back again to the clock, and this time I armed myself with the spear for personal protection and also opened the tin of cat food, which I had forgotten about, as a possible bribe.

The tiger was mollified somewhat by the cat food, but all was not quite well – it was still distressed in some way. Eventually, I figured out that I needed to be a dentist. So feeling very brave, I pulled a tooth.

In the cave system I found an icicle which dropped when I shouted, and then a fox that took the bone. Having watched a fox on the lawn pinch one of my dog's bones pointed me towards the solution to this problem.

Baulked at the wall of ice, I went back to the clock once more. I added the pick to my collection and restarted.

Once I had successfully hacked through the wall I found a way South. It took a long time to realise that I had to throw the icicle here to make a path across the lake.

I was glad of the pick again in the throne room; it gave me a sword ultimately. Even so, I needed a great deal of courage to enter the pool of icy water and finally wend my way down the stream and back to the clock.

The lesson from this example is that persistence pays. Progress is gradual, but cumulative in nature. I repeat, regular saves are essential. As I constantly preach, better saved than sorry.

Some software houses hardly put that much entertainment into a whole adventure. My rickety maths suggests that Level 9 offers another 90 per cent by way of entertainment for about the same money as lesser writers put into a complete adventure.

Final thought for the month: On the

Problem Corner

Kenneth Hardacre is stuck in the mazes in Melbourne House's **Classic Adventure,** so if a reader could send me maps of each maze I'll see they go into the column. He can't be the only person stuck like this.

D.R. Hunt has problems with **Circus Adventure** like Miss Mell. (See Helpline). He can't find any petrol for the car, wonders how to use the pile of rope and the snorkel and if the command SAY has any real value.

Can anyone supply solutions to **Waxworks** and **Holy Horrors** for David Chapman?

Paul Gough needs help in **The Hulk.** Can you stop the gas permeating your skin, and how can you get the wax from the killer bees?

Paul asks for suggestions for his next adventure – try **Dungeon Adventure** by Level 9.

Finally, can anyone let me have a complete map and solution to Acornsoft's **Countdown to Doom?** A.D. Marter needs one last treasure.

Hall of Fame

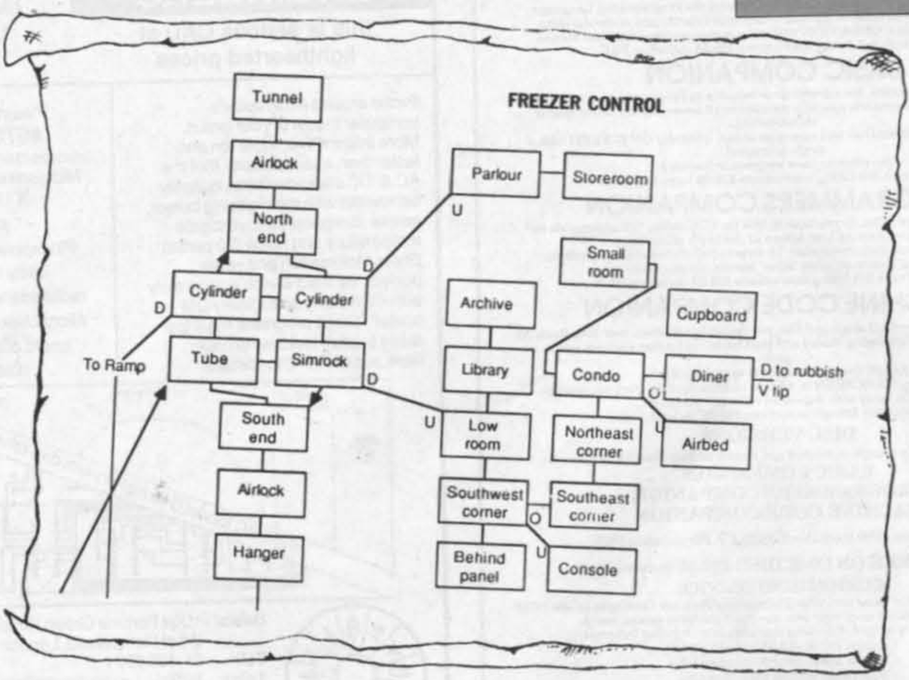
Roger Barret and Darren Elliot have completed Audiogenic's **Thunderstruck,** and have sent in solutions. When space permits I'll include them.

Alisdair Jorgensen is the first person to send me a complete solution to **Twin Kingdom Valley;** look out for it soon.

Ian Rainey of Bangor has a way of stopping arrows in **Wisadore:** *LOAD the main game, then type in ?&39AA=0 to stop the Archer's arrows. Type in ?&3B00=&7F and the bird fires half a man which won't kill you.

Stuart Brown of Hamilton in New Zealand has sent a solution to **Red Moon;** well done.

Congratulations also to Neil Shipman of Bristol for the first solution to **What's Eeyores by Magus.**



Part I of the Snowball Map

Elite front. I am now Deadly, but have you noticed how, if you linger to admire the view after launching, your ship is likely to be rammed in the rear by some hairy pirate who didn't look where he was going?

I wouldn't mind, but to add insult to injury you are then punished by being given Fugitive status, with all the extra hassle that entails.

Oh yes, and after the full solution of Snowball, I've included part one of the completed map from Stuart Booth.

See you next month. Until then, happy adventuring.

Helpline

Cheryl Hiley has lost the documents in **Kingdom of Hamil**. Visit the crypt, go W, open the tomb, lure the vampire to the tapestry room, lift the curtain to kill the vampire and then revisit the tomb where the documents are.

Stuart Booth offers help to Miss T.Mell stuck in **Circus Adventure**. The lamp: Open the car boot and there it is. The clown: He wants you to dress for the occasion. The maintenance wagon: Try bashing the door.

Kamlesh Pamim has just completed **Kayleth** by Adventure Soft and is willing to help anyone. Send me your problems and I'll pass them on to him.

S. O'Shaughnessy can't get the final score point in **Philosophers Quest:** The last thing to do is SAY BLACH.

In Program Power's **Adventure**, David Chamberlain needs to turn off the lamp and enter HOOT. An owl will then kill the rat.

The password for Edward Gill to get out of the maze in **Castle of Riddles** is RAINBOW.

A number of readers have offered further advice on dealing with the Green Knight in **Lord of the Rings**.

The full solution involves the following elements: Confront him alone; attack him at least three times; take the medallion and visit the monk; collect the rest of the party and go to the Red Tower; keep saying "No" to the lady; take both medallions back to the monastery, which you will now be able to enter.

Thanks to Richard Entwistle for these details: M.R.Mitchell might find that if he does all this he can then enter Moria safely (as long as Gandalf is with him) without his micro hanging up.

Mitchell was also stuck in the shooting gallery in **Castle of Riddles:** I hope he saw the answer in the March issue.

Nick Southgate's problems with Worm in Paradise have been solved by Sheila Thomas. The visor is in the dream dome at the start of the adventure. Take, wear and later drop it to experience the dreams.

He must avoid the one-armed bandit. When the monster is roused, go E,S,W and move so that when it jumps, it gets stuck in the ravine. Go W on to its back and take the scale.

Put the bench under the tree and stand on it to reach the apple; sit on the chair in the habihomes, sleep on the bed and use it as a slide down into the passages beneath the city by giving the command BED as you lie on it.

Buy the dog as soon as you have enough credit. As I surmised, the pizza is to be ignored.

Some answers for M.Meggs who had problems in **Programmers Revenge.** The north exit in Fort Knox is a bug; to get the urn type GET ASHES; to pass the mirror you need the amulet from the pyramid; to pass one troll, wear a badge, the other needs gassing. Thanks to K.R. Finn and Douglas Boffey.

J. Hemming offers help to Adam Halley with **Old Father Time.** Get the lamp from the catacombs, the mirror from the mine shaft and go to the bar of light. SAY EQUILIBRIUM here.

In the cylindrical room enter OMEGA to move elsewhere. The lamp needs to be turned off then to stop it being stolen, wave the rod and relight the lamp once you are visible again.

But how is the dwarf in the cage freed? Can someone supply the answer to this puzzle please?

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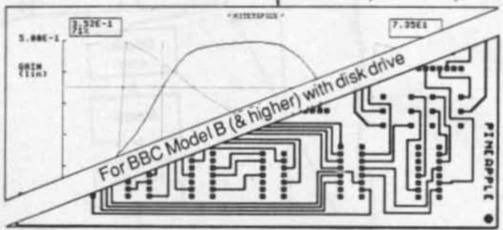

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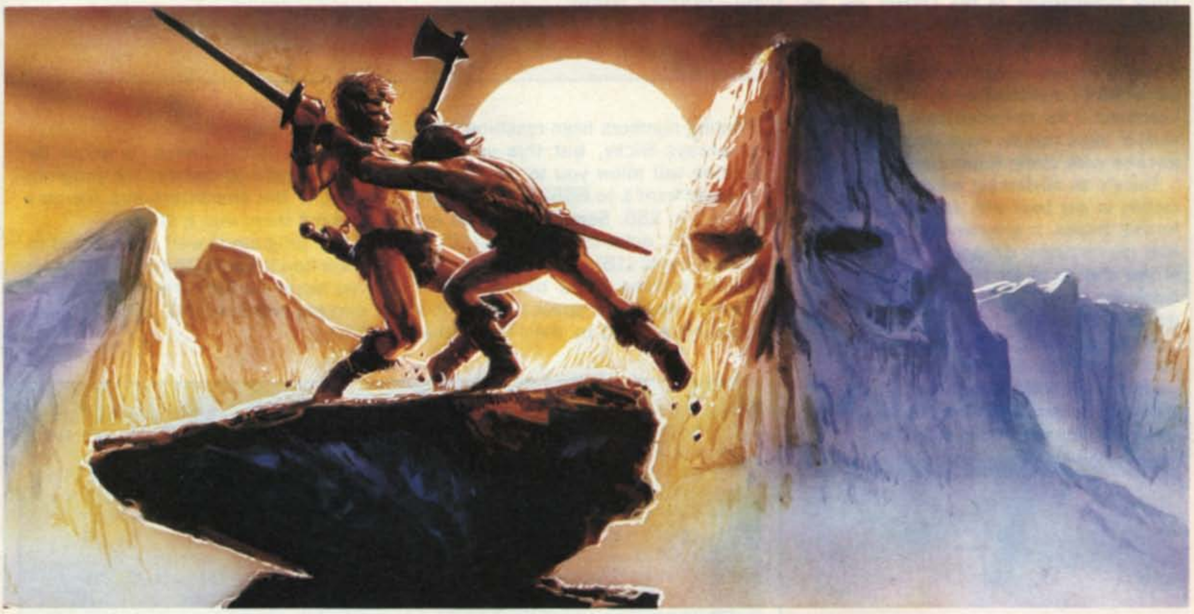

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THE MICRO USER PROGRAM Library No. 3

Compiled by Steve Turnbull

YOUR submissions to the Library are coming in thick and fast now – thank you for them all.

Just when you thought it was safe to use an INPUT statement we have the final instalment of the protected input saga for number input and the requested "ideal" machine code string output routine.

There's an all-dancing number output routine in any base with suppression of leading zeroes, a program-less diary to help you remember dates and – for those of you who go in for big programs – a quick disc title check to ensure the right disc is in the drive.

Where applicable in the routines here you'll need to transfer everything contained in PROCinitialise into your program. And of course all the assembly language will also need to be transferred.

Title: NUMBER BASES
Language: 6502 Assembler
Author: Jonathan Temple

Printing numbers from machine code is always tricky, but this versatile routine will allow you to display any number from 1 to 65535 in any base from 2 to 255. Sensible choices are binary (2), octal (8), decimal (10) or hexadecimal (16).

The routine does not generate leading zeroes or spaces, but prints numbers aligned by their first rather than last digit.

If you want tidiness, it would be fairly simple to convert the program to poke the characters into memory and put them into a string.

The program is well commented to show how it works. The key lines to let you incorporate the routine into your own program are 180, 190, 200 and 210.

```
100 REM ****************
110 REM * Number Bases *
120 REM ****************
130 PROCinitialise
140 REPEAT
150 INPUT'"Number: "number%
160 INPUT"Base  : "base%
170 PRINT"Result: ";
180 X%=number%MOD256
190 Y%=number%DIV256
200 A%=base%
210 CALL radix
220 UNTIL A%=0
230 END
240 ---
250 DEF PROCinitialise
260 DIM code 100
270 oswrch=&FFEE
280 n-base=&70
290 lo-num=&71
300 hi-num=&72
310 lo-wrk=&73
320 hi-wrk=&74
330 PROCassem
340 ENDPROC
350 ---
360 DEF PROCassem
370 FOR L%=0 TO 2 STEP 2
380 P%=code
390 [OPT L%
400 .radix
410  STX lo-num \save the number
420  STY hi-num
430  STA n-base \and the base
440  TAY        \zero base?
450  BEQ exit   \then exit
460  DEY        \base = 1?
470  BEQ exit   \then exit
480  LDA #255   \set end flag
490 .nbit
500  PHA        \push Acc = either
510  LDA #0     \digit or flag
520  STA lo-wrk \clear the workspace
530  STA hi-wrk
540  LDX #16    \and set for 16 bits
550 .next
560  ASL lo-num \shift the next
570  ROL hi-num \bit up into the
580  ROL lo-wrk \workspace to
590  ROL hi-wrk \prepare for sub-
600  LDA lo-wrk \traction.
610  SEC
620  SBC n-base \subtract the base
630  TAY        \save remainder
640  LDA hi-wrk \subtract hi part
650  SBC #0     \of base (zero)
660  BCC done   \until <0
670  INC lo-num \add in borrow
680  STY lo-wrk \and save the
690  STA hi-wrk \remainder
700 .done
710  DEX        \loop round for
720  BNE next   \the next bit
730  LDA lo-wrk \get next digit
740  LDY lo-num \check for end
750  BNE nbit
760  LDY hi-num \of divisions
770  BNE nbit
780 .out        \repeat
790  CMP #10    \output the contents
800  BCC add    \of Acc, as number
810  ADC #6     \or letter if
820 .add
830  ADC #48    \greater than 9
840  JSR oswrch
850  PLA        \get next digit
860  BPL out    \until flag reached
870 .exit
880  RTS
890 ]:NEXT
900 ENDPROC
```

Send your routines – with full details of the language it is written in and the hardware/software requirements – on disc or tape to:

Steve Turnbull, Library, The Micro User, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Remember to enclose a stamped addressed envelope for the return of your media. Five blank discs will be sent to the authors of any routines published.

Title: PROGRAM-LESS DIARY
Language: Basic (any)
Author: Peter H.H.Jones

Writing diary programs is a long and complex business, but you can produce a perfectly acceptable diary without any programming knowledge at all. Just use line numbers as dates.

The first two digits of a four digit line number are used to define the month:

```
01 - January
11 - November
```

The next two digits are used to indicate the day:

```
0101 - New Years Day
1225 - Christmas Day
```

This numbering system can be used for "whole day" events, with the 00 number marking the start of the month:

```
1100 November
```

For particular appointments on a given day you can add another digit, allowing 10 appointments a day:

```
10234 Go to the Dentist 12.30
```

specifies the fifth appointment on October 23. By doing a LIST 10230,10239 you can see all the appointments on that day. Because they are Basic lines you can edit and delete them as if they were Basic.

You can produce a hard copy easily and save the diary with the normal SAVE command, perhaps using the year as the filename.

Title: PROTECTED NUMBER INPUT
Language: Basic I or better
Author: Teri Paul

The protected string input routine in Library No.2 can be used to control the input of positive integer numbers as well as strings. But it cannot impose the usual requirement that the number allowed is between maximum and minimum limits.

If you are only accepting a single digit, perhaps from a menu, the easiest technique is to use the FNin routine:

```
choice=FNin("1234")
```

But for larger numbers a new routine is used. I have not included the routines from Library No.2, but they must be included if the program is going to work.

Line numbers are not important because none of the routines use any GOTOs or GOSUBs.

The program works by setting *L%* to the length of the string version of largest permissible number, *max%*, then entering the string input routine, allowing only digits 0-9 to be pressed, no initial string and making it allowable to press Return without any other input.

If you press Return without typing a number in the number is set to *min%* and the routine is exited.

If a number has been typed in it is checked against the maximum and minimum values. If it is within the limits then the routine returns the value, otherwise the number is deleted from the screen and you can input a different one.

```
100 REM ****************
110 REM * Number Input *
120 REM ****************
130 PROCinitialise
140 PROCcursoff
150 REPEAT CLS
160 N%=FNnum("Input a Value",50,100)
170 UNTIL N%=100
180 PROCcurson
190 END
200 ---
210 DEF PROCinitialise
220 nm$="0123456789"
230 sp$=" "
240 dl$=CHR$127
250 ln$=CHR$21
260 cr$=CHR$13
270 ENDPROC
280 ---
290 DEF FNnum(t$,min%,max%)
300 LOCAL n$,L%,N%,X%,Y%
310 PRINT t$" : ";
320 X%=POS:Y%=VPOS
330 n$=STR$ max%
340 L%=LEN n$
350 PRINT n$;
360 REPEAT
370 PRINT STRING$(LENn$,dl$);
380 n$=FNstr(nm$,"",L%,TRUE)
390 N%=VAL n$
400 IF n$="" N%=min%:n$=STR$N%
410 PRINTTAB(X%,Y%)n$;
420 UNTIL N%>=min% AND N%<=max%
430 PRINT:=N%
440 ---
450 DEF FNstr(k$,s$,L%,T%)
```

Title: DISC TITLE CHECKER
Language: 6502 Assembler/Basic II
Author: Malcolm C.Broughton

When writing a program suite which requires the use of more than one disc it is prudent to let the computer check which disc is in use before accessing it, to reduce the possibility of a crash.

This routine uses osgbpb 5 to find the title of the current disc and compares it with a title provided as a parameter to PROCd_check.

If the comparison is not equal a message is displayed and the exercise repeated until a match is found.

In the demonstration, if the correctly titled disc (as defined by PROCd_check) is in the drive then "Correct disc" is displayed.

You will need to transfer PROCd_check to your program, as well as the contents of PROCinitialise and PROCassemble_code.

```
100 REM ***************************
110 REM * Disc Checking Routine  *
120 REM ***************************
130 MODE 7
140 PROCinitialise
150 PROCd-check("Micro User")
160 PRINT "Correct disc"
170 END
180 ---
190 DEF PROCinitialise
200 DIM lencheck 20:check=lencheck+1
210 DIM lentitle 20:title=lentitle+1
220 DIM code 100:osgbpb=&FFD1
230 PROCassemble-code
240 ENDPROC
250 ---
260 DEF PROCd-check($check)
270 ?lencheck=LEN$check
280 CALL compare
290 IF ?lencheck=&FF ENDPROC
300 T$=CHR$136+$check+CHR$137
310 REPEAT PRINT "Insert "T$" disc"
320 PRINT"Press space to continue";
330 REPEAT UNTIL GET=32
340 CALL compare
350 UNTIL ?lencheck=&FF
360 ENDPROC
370 ---
380 DEF PROCassemble-code
390 FOR L%=0 TO 2 STEP 2
400 P%=code:[OPT L%
410 .compare
420  LDX =parameter-block MOD256
430  LDY =parameter-block DIV256
440  LDA =5:JSR osgbpb
450  LDA lencheck
460  CMP lentitle
470  BEQ skip
480  BCS different
490 .skip
500  LDX =0
510 .compare-loop
520  LDA check,X
530  CMP title,X
540  BNE different
550  INX
560  CPX lencheck
570  BNE compare-loop
580  LDA =&FF
590  STA lencheck
600 .different
610  RTS
620 .parameter-block
630  EQUB 0
640  EQUD lentitle
650  EQUD 0
660  EQUD 0
670 ]:NEXT
680 ENDPROC
```

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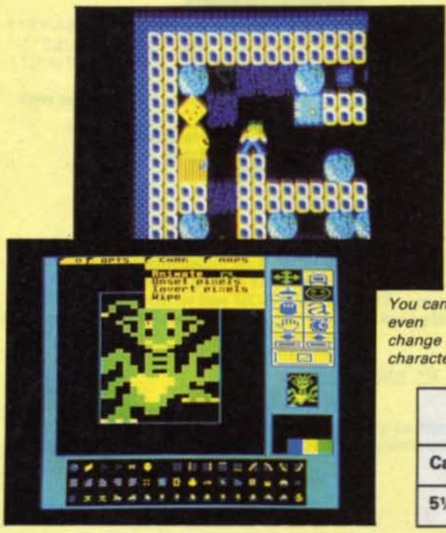
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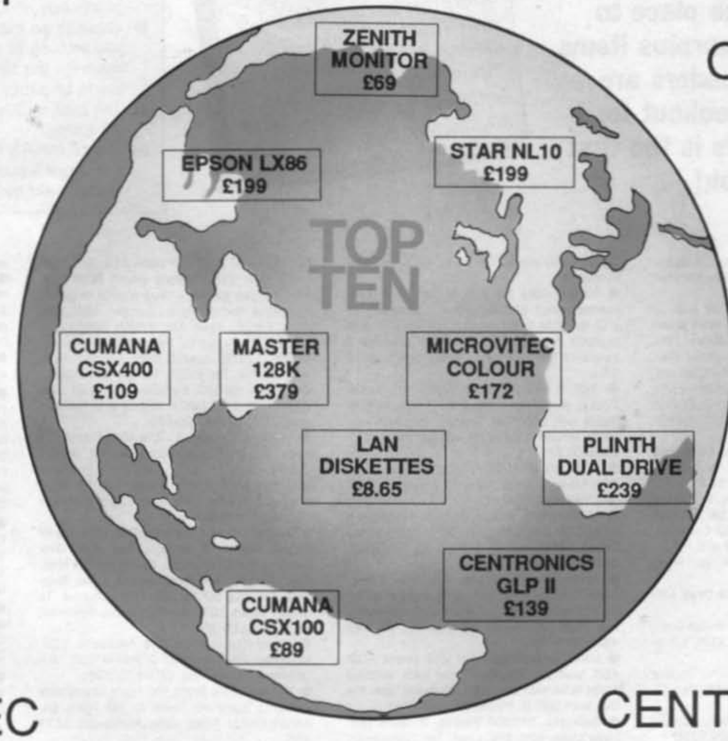
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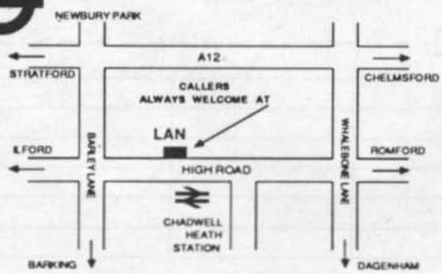
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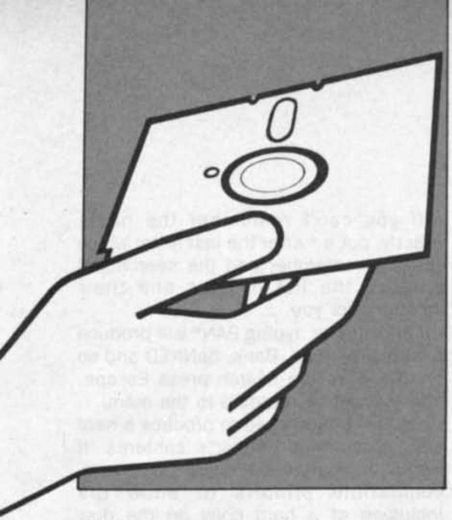

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Disc Cataloguer is a fast and efficient way of managing files, typically being able to find a specified one from a catalogue of 40 discs within eight seconds.

The system can cope with a maximum of about 200 discs-worth of information on 80 track or 92 discs on 40 track.

A useful feature is that the contents of a disc's catalogue can be viewed quickly along with the free space and the number of free filenames on the disc.

There is an extremely fast ambiguous search of all records for a filename using * DFS-type syntax if required. And the ability to print out contents of a range of discs in condensed format, allowing the record to be stuck on to the disc sleeve, is provided.

A space search facility allows a specified size of free disc sectors to be found – a useful feature when trying to find a space for that long file.

Finally, the program can handle the 62 files of Watford-type DFS's without speed or capacity penalty.

It will take a fair amount of typing to get this suite of programs into operation, but being able to instantly examine any of your discs, and the fast search, will certainly save a lot of time and head scratching.

However, there is a lot of typing here so you may find the monthly cassette or disc a real boon.

The programs use only legal OS calls, and have been tested on Acorn DFS 0.9, DNFS, 2.1(1771), 2.2 and Watford DFS 1.3, 1.4. The speed of search on Acorn DFS 2.2 is approximately 50000 filenames a minute.

The main program is called CATALOG and is written in Basic. Machine code has been used only when required for speed, that is in sorting, searching and character replacement.

The machine code routines have been listed in a form which makes them easy to type in and check.

Type in each of the listings first exactly as shown, but without the space after the line number (we used LISTO1 to print it).

Make sure you leave in all the Rems, otherwise you will have programs which are too short. Save them on to the File disc.

Now run CODER (Listing III). If a Checksum error is flagged look for the error in the listing between the lines indicated in the message.

When there are no errors the program will save a file called MULTCOD. It is this file which contains the sort, search and character replacement routines.

Now take a freshly formatted disc and type:

```
*BUILD !BOOT
0001 CHAIN "CATALOG"
0002 (Escape)

*OPT4,3
```

Copy the files CATALOG, SEARCH and MULTCOD from the File disc on to this new disc (which we will call the Program disc) and type:

```
*INFO *.*
```

And you should see something like:

```
$.!BOOT         000000 FFFFFF 000012 002
$.CATALOG       FF1900 FF8023 0020FE 003
$.SEARCH        FF1900 FF8023 0006EE 024
$.MULTCOD       000900 000900 000280 02B
```

If the two files CATALOG or SEARCH are longer than &2100 or &700 respectively, have a look at the listings and remove any unnecessary spaces or REMs to reduce them so that they are about the same length as shown.

Now load SETUP from your File disc, put the Program disc into the drive and type RUN. Respond to the questions and the disc will be configured and a new file SP, will be saved on to it.

The program SETUP should only be run to initialise the system, because it deletes any disc records which were there beforehand.

The system can be configured to any arrangement of drives – single or dual, 40 or 80 track, single or double-sided. For example, if you have dual single-sided 80 track drives respond 8.1.1 to the three questions. This will allow you to keep the program disc in drive 0 and put the disc being updated into drive 1.

If you have 80 track drives there is no problem with reading 40 track disc catalogues on to the system, as the disc catalogues are on track zero.

Always use the 80 track setting because it will allow you the larger capacity and you can leave your drives switched to 80 track.

Now ensure that the disc is properly configured by typing:

```
*INFO *.*
```

You will then see:

```
$.!BOOT         000000 FFFFFF 000012 002
$.CATALOG       FF1900 FF8023 0020FE 003
$.SEARCH        FF1900 FF8023 0006EE 024
$.MULTCOD       000900 000900 000280 02B
$.SP            000000 000000 0000FF 02E
f.RECORD        000000 000000 000014 02F
f.EXTRA         000000 000000 001F40 030
f.File          000000 FFFFFF 02B800 050
```

The length of f.file will be &14000 if it is a 40 track version. It is imperative that f.file starts at sector &050. If you find that it does not it is because either CATALOG or SEARCH is too long or short.

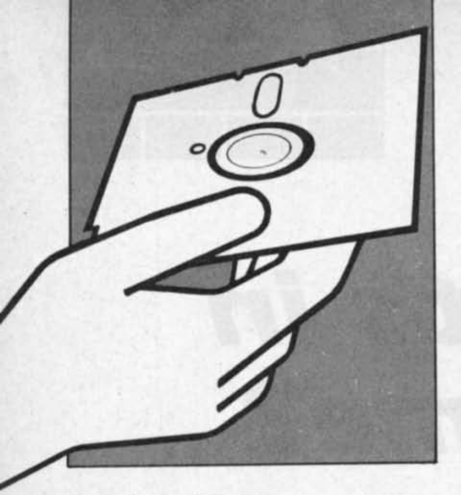
If they are too long then you can delete characters from REM statements until the length is right and then *COMPACT the disc.

If they are too short, you will have to delete the f.file from the disc, add the necessary characters to the programs, *COMPACT then rerun the SETUP program.

Don't forget to put the correct length programs on to your File disc.

Write-protect your Program disc, and test options 1, 2 and 4 to 6 in the CATALOG program. Ensure that the REM

Turn to Page 136 ▶



◄ *From Page 135*

statements in lines 60 and 70 are not removed before debugging is complete so that all the error messages are reported.

Now take the write-protect tab off the Program disc, use option 1 to add the files of one disc, then replace the tab. You can now test option 3, which calls the SEARCH program.

When you are sure that everything is working correctly remove the REM part of lines 60 and 70 in CATALOG and save it, and the REM part of line 100 in SEARCH and save that.

You can copy both on to your File disc so that you have a backup of all the original working programs.

Now lock all the files in the $ directory by typing:

```
*ACCESS $.* L
```

This is a good time to make a backup copy of the whole disc so that in future you do not need to go through the whole procedure again if you want to start a new catalogue.

Before you use Disc Cataloguer you will have to number all your discs 1, 2, 3 and so on. The program refers to each disc by number only.

To use it simply insert the disc into the drive and press Shift+Break. The menu will be presented as will the number of disc records which are already stored on the Catalogue disc.

Option 1 is used when a disc has been altered and its record is to be updated. Try it with a 40 or 80 track disc and follow the instructions.

Option 2 is used to read the catalogue information of a disc. Try it, specifying the number of the disc that you have just added to the Catalogue disc.

Option 3 is used to enter the search routine. If you want a printout of the results then reply Y to the first question – otherwise press any key. The printout is useful when rationalising the use of disc space to remove excess backup copies of files.

Now enter the name of the file you are looking for – the Caps Lock on the keyboard is set by the program and all input is in capitals. The program ignores upper and lower case differences during SEARCH because the DFS does.

If you can't remember the name exactly, put a * after the last letter which you can remember and the search will produce the list of files and their locations for you.

For example, typing BAN* will produce files like bananA, Bank, baNNED and so on. To leave the search press Escape, and you will be returned to the menu.

Option 4 allows you to produce a hard copy of a range of disc's contents. It works in condensed mode on Epson-compatible printers to allow the inclusion of a hard copy on the disc sleeve.

Option 5 allows you to search for the amount of space you require on a disc. To look at all the available space press Return and you will notice that all the discs with no space on one side or the other will be in yellow.

If you specify a length either in hex or decimal, a disc which has insufficient space will not be displayed and those with exactly the right space will be in yellow. Those with more space than required will be in green.

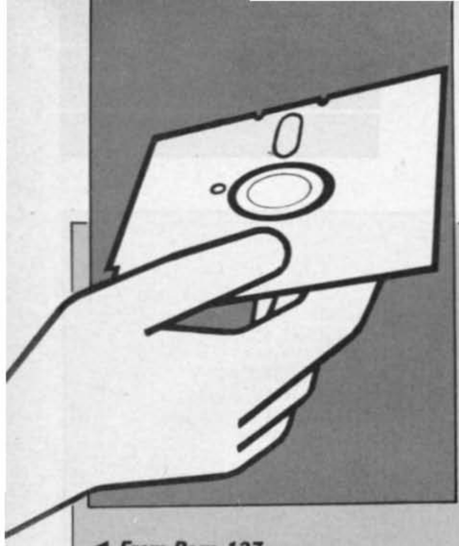
Option 6 allows you to back up the disc to another for security. This uses the *BACKUP command, and wipes the Catalogue program from memory, so be careful.

So there you have it, a Disc Cataloguer to solve all your file name problems in one go.

Listing I

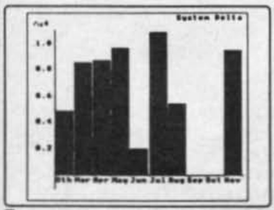
```
   10 REM Listing 1 "$.catalog"
   20 REM by John Macrae
   30 REM BBC B,B+/128
   40 REM Master 128
   50 REM (c) Micro User
   60 REMONERRORPROCtidy
   70 REM*FX200,2
   80 *FX212,200
   90 *FX213,200
  100 *FX214,5
  110 *FX5,1
  120 *FX6,10
  130 *DRIVE 0
  140 CLEAR
  150 MODE7
  160 VDU15,23,0,8,&90;0;0;0,23,0,9,&09;
0;0;0
  170 VDU23;8202;0;0;0
  180 PROCdrive
  190 P%=40
  200 IF allno%=200 P%=78
  210 length%=890
  220 PROCinit
  230 PROCoscli("LOAD MULTCOD 0900")
  240 REPEAT:PROCmenu:UNTILFALSE
  250 END
  260 :
  270 DEFPROCcat
  280 REM Reads catalogues,sorts and the
n
  290 REM splits them
  300 dr%=drive%
  310 NO%=61
  320 PROCd(dr%)
  330 CALL&AC9,filenam$(0),NO%
  340 PROCoutpform
  350 IFdr%=drive%+2 title$=TEMP$:ENDPRO
C
  360 IFsides%=1 ENDPROC
  370 dr%=drive%+2:TEMP$=title$:GOTO310
  380 ENDPROC
  390 :
  400 DEFPROCinit
  410 REM dims workspace
  420 DIMfilenam$(61)
  430 DIMbl%10,sp%&400,AR%(199,7)
  440 ENDPROC
  450 :
  460 DEFPROCdir
  470 REM Reads the catalogue
  480 ?&80=dr%
  490 !&81=sp%
  500 !&85=&00005303
  510 ?&89=&24
  520 X%=&80:Y%=0:A%=&7F:CALL&FFF1
  530 IF?&8A<>0 PRINTCHR$129;"Disc error
 check format""Press a key":X=GET
  540 ENDPROC
  550 REM
  560 DEFPROCd(dr%)
  570 REM Splits the data into filenames
  580 REM and title
  590 FORI%=sp% TO sp%+&3FC STEP4
  600 !I%=&20202020
  610 NEXT
  620 PROCdir
  630 flag%=0
  640 FORI%=0TO7
  650 IF?(sp%+&200+I%)=&AA flag%=flag%+1
  660 NEXT
  670 IFflag%=8 FILE=62
  680 title$=""
  690 FORI%=0TO61
  700 filenam$(I%)=STRING$(7," ")
  710 NEXT
  720 FORI%=0TO7
  730 V%=(?(sp%+I%)AND127)
  740 IFV%<32 V%=32
  750 title$=title$+CHR$V%
  760 NEXT
  770 FORI%=0TO3
  780 V%=(?(sp%+&100+I%)AND127)
  790 IFV%<32 V%=32
  800 title$=title$+CHR$V%
  810 NEXT
  820 !&80=sp%
  830 CALL&A8D
  840 noent%=?(sp%+&105)DIV8
  850 FORI%=0TO(noent%-1)
  860 T%=sp%+&0F+I%*8
  870 filenam$(I%)=$(T%-7)
  880 NEXT
  890 PROCextra
  900 IFflag%<>8 ENDPROC
  910 noent%=?(sp%+&305)DIV8
  920 FORI%=31TO(31+noent%-1)
  930 T%=sp%+&20F+(I%-31)*8
  940 filenam$(I%)=$(T%-7)
  950 NEXT
  960 ENDPROC
  970 REM
  980 DEFPROCoutpform
  990 REM Puts the filenames and title
 1000 REM into 5 strings for storage
 1010 CLS:PRINT
 1020 IF?&8A<>0filenam$(0)="Disc   ":fil
enam$(1)="error  ":filenam$(2)="or  un-"
:filenam$(3)="formatd"
 1030 FORI%=0TO30
 1040 cat1$=cat1$+filenam$(I%)
 1050 NEXT
 1060 cat1$=cat1$+STRING$(217-LEN(cat1$)
," ")
 1070 FORI%=31TO61
 1080 cat2$=cat2$+filenam$(I%)
 1090 NEXT
 1100 cat2$=cat2$+STRING$(217-LEN(cat2$)
," ")
 1110 IFdr%=drive%cat4$=cat2$:cat3$=cat1
$:cat2$="":cat1$=""
 1120 IFsides%=1 cat1$=STRING$(217," "):
cat2$=cat1$
 1130 ENDPROC
 1140 :
 1150 DEFPROCreadrec(n%)
 1160 REM Reads data of 1 disc
 1170 c%=OPENUP("f.file")
 1180 PTR#c%=n%*length%-length%
 1190 INPUT#c%,title$,cat1$,cat2$,cat3$,
cat4$
 1200 CLOSE#c%
 1210 PROCrxtra(n%)
 1220 ENDPROC
 1230 :
 1240 DEFPROCwrite(n%)
 1250 REM Writes data of 1 disc
 1260 c%=OPENUP("f.file")
 1270 PTR#c%=n%*length%-length%
 1280 PRINT#c%,title$,cat1$,cat2$,cat3$,
cat4$
 1290 CLOSE#c%
 1300 PROCwextra(n%)
 1310 ENDPROC
 1320 :
 1330 DEFPROCaddadisc
 1340 REM Routine for adding/updating di
sc
 1350 CLS
 1360 PRINTTAB(5,2)CHR$131;"ENTER DISC N
UMBER ";:INPUTnumber%
 1370 IFnumber%<1GOTO1350
 1380 IFnumber%>allno%PRINTTAB(10,4)CHR$
129CHR$136;"TOO BIG";CHR$131;"PRESS A K
EY":X=GET:IFX<>0GOTO1350
 1390 IFnorecords%>=number%PRINTTAB(10,4
)CHR$130;"THIS DISC IS ALREADY"TAB(10,5
)CHR$130;"ON RECORD ":PRINTCHR$133;"DO
YOU WISH TO";CHR$131;CHR$136;"UPDATE";CH
R$137;CHR$131;"IT?"ELSE1410
 1400 Y$=GET$:IFY$="Y"ORY$="y"CLS:GOTO14
20ELSEGOTO1350
 1410 IFnumber%>=norecords%+1PRINTTAB(5,
4)CHR$131"Number the next disc";CHR$131C
HR$136;norecords%+1:number%=norecords%+1
 1420 PRINTTAB(5,8)CHR$130;"ENTER DISC T
O BE CATALOGUED"CHR$130;"      INTO DRIV
E ";drive%:PRINTTAB(5,11)CHR$131;"PRESS"
;CHR$136;CHR$130;"SPACE";CHR$137;CHR$131
"WHEN READY"
 1430 Y=GET:IFY<>32GOTO1420
 1440 PROCcat
 1450 CLS:IFdrive%=1GOTO1480
 1460 PRINTTAB(5,15)CHR$133;"NOW ENTER";
CHR$131;"PROGRAM";CHR$133;"DISC"":PRINTT
AB(5,17)CHR$133;"PRESS";CHR$130;CHR$136;
"SPACE";;CHR$137;CHR$133;"WHEN READY"
 1470 Y=GET:IFY<>32GOTO1450
 1480 CLS:PRINTTAB(5,15)CHR$133;"STORING
 DATA"
 1490 PROCwrite(number%)
 1500 IFnumber%>norecords% THEN norecord
s%=number%
 1510 C%=OPENUP("f.RECORD")
 1520 PRINT#C%,norecords%
 1530 CLOSE#C%
 1540 ENDPROC
 1550 :
 1560 DEFPROCmenu
 1570 *FX15,1
 1580 cat1$="":cat2$="":cat3$="":cat4$=
""
 1590 VDU26:CLS
 1600 PRINTTAB(3,2)CHR$141;CHR$133;"=";C
HR$131;"Micro User Cataloguer";CHR$133;
"="
 1610 PRINTTAB(3,3)CHR$141;CHR$133;"=";C
HR$131;"Micro User Cataloguer";CHR$133;
"="
 1620 PRINTTAB(5,7)CHR$134;"1.Catalogue
a disc"
 1630 PRINTTAB(5,9)CHR$134;"2.Print a di
sc's catalogue"
 1640 PRINTTAB(5,11)CHR$134;"3.Search fo
r a file"
 1650 PRINTTAB(5,13)CHR$134;"4.Printout
of range of discs"
 1660 PRINTTAB(5,15)CHR$134;"5.Space sea
rch"
 1670 PRINTTAB(5,17)CHR$134;"6.End (back
s up data files)"
 1680 PRINTTAB(5,21)CHR$131;CHR$136;"PLE
ASE CHOOSE"
 1690 PRINTTAB(4,19)"  ";norecords%;CHR$
130;"Discs on record"
 1700 PRINTTAB(5,24)CHR$133;"(C) Micro U
ser 1987"
 1710 X=GET-48:IFX=1PROCaddadisc
 1720 IFX=2PROClist
 1730 IFX=3PROCsearch
 1740 IFX=4PROCoutput
 1750 IFX=5PROCsp
 1760 IFX=6PROCEN
 1770 ENDPROC
 1780 :
 1790 DEFPROClist
 1800 REM Inputs file no to be displayed
 1810 CLS
 1820 PRINTTAB(2,4)CHR$131;"ENTER DISC N
UMBER TO BE LISTED ";:INPUTnumber%
 1830 IFnumber%<1 VDU7:GOTO1810
 1840 IFnumber%>norecords% VDU7:GOTO1810
 1850 PROClistit(number%)
 1860 ENDPROC
 1870 :
 1880 DEFPROClistit(n%)
 1890 REM Displays file on screen/printe
r
 1900 PROCreadrec(n%):*FX5,0
 1910 CLS:*FX5,1
 1920 VDU1,27,1,64
 1930 VDU1,27,1,45,1,1,1,15
 1940 PRINTCHR$129;"DISC NUMBER ";CHR$13
1n%;"   ";CHR$131;"TITLE ";title$:VDU1,2
7,1,45,1,0
 1950 PRINT
 1960 M12%=M1%
 1970 IFL1%=62M12%=M1%-2
 1980 PRINTCHR$134;"&";~M12%-K1%-2;CHR$1
30;"SECTORS FREE ON";:PRINT" ";M1%DIV10;
CHR$130;"TRACKS"
 1990 PRINT'CHR$134;L1%-J1%;CHR$130;"FIL
ENAMES AVAILABLE"
 2000 VDU28,0,22,39,6
 2010 VDU30
 2020 PROCsplit(cat3$)
 2030 PROCsplit(cat4$)
 2040 VDU26,1,27,1,64
 2050 IFsides%=1GOTO2240
 2060 PRINT
 2070 *FX3,4
 2080 PRINTTAB(5,22)CHR$132+"SPACE FOR
";:*FX3,0
 2090 VDU1,27,1,45,1,1,1,15
 2100 PRINT"SIDE 2"
 2110 VDU1,27,1,45,1,0
 2120 PRINT
 2130 X=GET:IFX<>32GOTO2130
 2140 *FX5,0
 2150 CLS
 2160 PRINTCHR$129;"SIDE 2":*FX5,1
 2170 H12%=H1%:IFF1%=62H12%=H1%-2
 2180 VDU1,27,1,15
 2190 PRINT'CHR$134"&";~H12%-T1%-2;CHR$1
30;"SECTORS FREE ON";:PRINT" ";H1%DIV10;
CHR$130;"TRACKS"
 2200 PRINT'CHR$134;F1%-G1%;CHR$130;"FIL
ENAMES AVAILABLE"
 2210 VDU28,0,23,39,6
 2220 PROCsplit(cat1$)
 2230 PROCsplit(cat2$)
 2240 VDU26,1,27,1,64
 2250 *FX3,4
 2260 PRINTTAB(5,22)CHR$132+"SPACE FOR M
ENU"
 2270 *FX3,0
 2280 PRINT
 2290 X=GET:IFX<>32GOTO2290
 2300 ENDPROC
 2310 :
 2320 DEFPROCsplit(A$)
 2330 REM Splits data strings into files
 2340 FORI%=0TO30STEP4
 2350 M$=MID$(A$,7*I%+1,7)
 2360 N$=MID$(A$,7*I%+8,7)
 2370 O$=MID$(A$,7*I%+15,7)
 2380 P$=MID$(A$,7*I%+22,7)
 2390 IFASC(M$)<33ANDASC(N$)<33ANDASC(O$
)<33ANDASC(P$)<33GOTO2410
 2400 PRINTCHR$131M$+"  "+N$+"  "+O$+"  "+P
$
 2410 NEXT
 2420 ENDPROC
 2430 :
 2440 DEFPROCsearch
 2450 REM Enters the search proram
 2460 B%=norecords%
 2470 CHAIN"$.SEARCH"
 2480 ENDPROC
 2490 :
 2500 DEFPROCtidy
 2510 REM Tidies up if an error detected
 2520 VDU3
 2530 CLOSE#0
 2540 A$=CHR$131+"Check that program dis
c is in drive 0"
 2550 IFERR=6ORERR=222VDU12:PRINT"FILE N
OT FOUND"'"PRESS A KEY"'A$:X=GET:GOTO25
80
 2560 CLS:PRINTTAB(10,7)CHR$141;CHR$134;
"ERROR"
 2570 PRINTTAB(10,8)CHR$141;CHR$134;"ERR
OR":PRINTTAB(0,10)A$;TAB(0,12);CHR$134;"
PRESS A KEY":X=GET
```

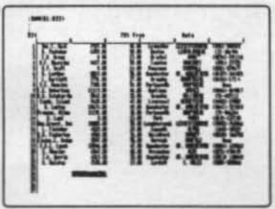
Turn to Page 138 ▶



◀ From Page 137

```
 2580 CLEAR
 2590 RUN
 2600 ENDPROC
 2610 :
 2620 DEFPROCoutput
 2630 REM Enters the range of records to
 2640 REM be printed out
 2650 VDU12:F%=0:PRINTTAB(2,5)CHR$(134);
"PRINT FROM WHICH RECORD ";:INPUTbegin%:
PROCC(begin%):PRINTTAB(2,10)CHR$(134);"T
O WHICH ";:INPUTlast%:PROCC(last%)
 2660 IFF%=1GOTO2650
 2670 IFlast%<begin%GOTO2650
 2680 *FX21,3
 2690 VDU2:FORY%=begin%TOlast%
 2700 *FX138,0,32
 2710 *FX138,0,32
 2720 PROClistit(Y%)
 2730 PRINT
 2740 NEXT
 2750 VDU3
 2760 ENDPROC
 2770 :
 2780 DEFPROCC(N%)
 2790 REM Checks range of input numbers
 2800 IFN%<=0ORN%>norecords%F%=1
 2810 ENDPROC
 2820 :
 2830 DEFPROCEN
 2840 REM Backup routine
 2850 CLS:PRINTTAB(0,5)CHR$133;"Which dr
ive do you wish to backup to? ";CHR$131;
"(0-3)":INPUTZ%
 2860 IFZ%=2ORZ%=0ORZ%=1ORZ%=3GOTO2870EL
SE2850
 2870 X$=STR$(Z%):PROCoscli("K.0s%=&900|
M$s%="BACKUP 0 "+X$|L|MX%=0|MY%=&9|M*EN.
|MCALL&FFF7|L|M")
 2880 CLS:PRINTTAB(10,10)CHR$131;"PRESS
f0 to backup - careful!":END
 2890 ENDPROC
 2900 :
 2910 DEFPROCextra
 2920 REM Produces disc free space etc
 2930 IFflag%=8F1%=62ELSEF1%=31
 2940 G1%=?(sp%+&105)/8:g1%=0
 2950 IFF1%=62g1%=?(sp%+&305)/8
 2960 H1%=(?(sp%+&106)AND3)*&100+?(sp%+&
107)
 2970 G1%=G1%+g1%
 2980 T1%=FNLENGTH((G1%-g1%),&100):IFg1%
=0GOTO3000
 2990 T1%=T1%+FNLENGTH(g1%,&300)
 3000 IFdr%=drive%J1%=G1%:K1%=T1%:L1%=F1
%:M1%=H1%
 3010 ENDPROC
 3020 :
 3030 DEFFNLENGTH(D%,E%)
 3040 S%=0
 3050 IFD%=0S%=0:=S%
 3060 FORQ%=0TOD%-1:Z%=0:IF?(sp%+&0C+E%+
8*Q%)>0Z%=1
 3070 R%=?(sp%+E%+&0D+Q%*8)+(?(sp%+E%+&0
E+Q%*8)AND48)*&10+Z%
 3080 S%=S%+R%
 3090 NEXT
 3100 =S%
 3110 :
 3120 DEFPROCwextra(n%)
 3130 REM W rites the disc space info
 3140 REM to disc
 3150 X%=OPENUP("f.EXTRA")
 3160 PTR#X%=(n%-1)*40
```





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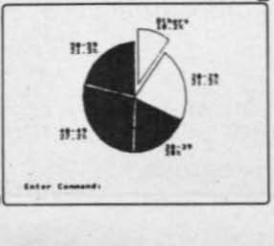

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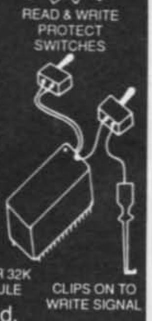

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```
 3170 PRINT#X%,J1%,K1%,L1%,M1%,G1%,T1%,F
1%,H1%
 3180 CLOSE#X%
 3190 ENDPROC
 3200 :
 3210 DEFPROCrxtra(n%)
 3220 REM R eads the disc space info
 3230 REM from disc
 3240 X%=OPENUP("f.EXTRA"):PTR#X%=(n%-1)
*40
 3250 INPUT#X%,J1%,K1%,L1%,M1%,G1%,T1%,F
1%,H1%
 3260 CLOSE#X%
 3270 ENDPROC
 3280 :
 3290 DEFPROCsp
 3300 REM Produce disc space info
 3310 REM on screen
 3320 PROCSC
 3330 n%=norecords%
 3340 X%=OPENUP("f.EXTRA")
 3350 FORI%=0TOn%-1:PTR#X%=I%*40
 3360 INPUT#X%,AR%(I%,0),AR%(I%,1),AR%(I
%,2),AR%(I%,3),AR%(I%,4),AR%(I%,5),AR%(I
%,6),AR%(I%,7)
 3370 NEXT
 3380 CLOSE#X%
 3390 FORI%=0TOnorecords%-1
 3400 sp0%=AR%(I%,3)-AR%(I%,1)-2
 3410 sp2%=AR%(I%,7)-AR%(I%,5)-2
 3420 Fn0%=AR%(I%,2)-AR%(I%,0):IFAR%(I%,
2)=62sp0%=sp0%-2
 3430 Fn2%=AR%(I%,6)-AR%(I%,4):IFAR%(I%,
6)=62sp2%=sp2%-2
 3440 IFFn0%>0ORFn2%>0PROCprt
 3450 NEXT
 3460 *FX15,0
 3470 PRINTCHR$131"ANY KEY FOR MENU":X=G
ET
 3480 VDU15
 3490 ENDPROC
 3500 :
 3510 DEFPROCprt
 3520 REM Sorts out whether disc has
 3530 REM the required space
 3540 IFreq%>sp2%sp2%=0
 3550 flag%=0
 3560 IFreq%>sp0%sp0%=0
 3570 IFreq%=sp2%ORreq%=sp0%flag%=1
 3580 IFreq%>sp2%ANDreq%>sp0%ENDPROC
 3590 PRINT" ";CHR$(130+flag%);
 3600 PRINT;I%+1,~sp0%,~sp2%
 3610 ENDPROC
 3620 :
 3630 DEFPROCSC
 3640 REM Sets up the screen and
 3650 REM enters the no of sectors req'd
 3660 CLS
 3670 PRINTTAB(5,5)CHR$(141);CHR$130;"SP
ACE SEARCH":PRINTTAB(5,6)CHR$(141);CHR$1
30;"SPACE SEARCH"
 3680 PRINTTAB(5,10)CHR$134;"ENTER NO OF
 SECTORS REQUIRED ":INPUTreq$:IFreq$=""r
eq$="0"
 3690 req%=EVAL(req$):IFreq%>&320ORreq%<
0GOTO3660
 3700 CLS
 3710 PRINTTAB(0,2)CHR$133;"DISC";SPC(12
);CHR$133;"SIDE 0   SIDE 2":PRINTTAB(0,2
4)CHR$133;"SHIFT to scroll"
 3720 VDU28,0,22,39,3,14:ENDPROC
 3730 :
 3740 DEFPROCdrive
 3750 REM Reads system params on startup
 3760 X=OPENUP("f.RECORD"):INPUT#X,norec
ords%,sides%,drive%,allno%
 3770 CLOSE#X
 3780 ENDPROC
 3790 DEFPROCoscli($sp%)
 3800 X%=sp% MOD &100:Y%=sp% DIV &100
 3810 CALL&FFF7
 3820 ENDPROC
```

Listing II

```
   10 REM Listing 2 "$.SEARCH"
   20 REM by John Macrae
   30 REM BBC B,B+/128
   40 REM
   50 REM Program to load disc data
   60 REM 23 discs at a time and search
   70 REM for specified filename
   80 REM or ambiguous filename
   90 REM
  100 REMONERRORVDU3:CHAIN"$.CATALOG"
  110 *FX6,10
  120 DIMdata%20735,bk%20
  130 CALL&0900
  140 PROCsetblock
  150 REM Main loop
  160 REPEAT:PROCsearch:UNTILFALSE
  170 :
  180 REM Loads data and enters search
  190 DEFPROCloadit
  200 PROCsk(0,0)
  210 ?&8C=B%
  220 noofloads%=B%DIV23
```

This is one of hundreds of programs now available FREE for downloading on

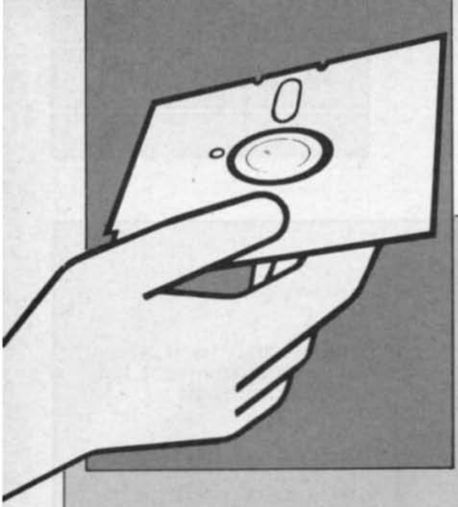
MicroLink

```
  230 FORI%=0TOnoofloads%
  240 D%=0
  250 bk%!1=data%
  260 PROCrb(0,7+8*I%,9,&21)
  270 FORD%=0TO7
  280 bk%!1=data%+D%*&0A00+&100
  290 IF 8+8*I%+D%>=P% GOTO310
  300 PROCrb(128,8+8*I%+D%,0,&2A)
  310 NEXTD%
  320 ?&8F=I%*10
  330 CALL&090D
  340 NEXTI%
  350 PRINT?&8D;CHR$134;"DISCS SEARCHED"
  360 ENDPROC
  370 :
  380 REM sets up osword data block
  390 DEFPROCsetblock
  400 ?bk%=0:bk%!1=data%:!&88=data%
  410 ?&8F=0
  420 X%=bk%MOD256:Y%=bk%DIV256
  430 ENDPROC
  440 :
  450 REM Seek Command
  460 DEFPROCsk(dr%,tr%)
  470 ?bk%=dr%:bk%?5=1:bk%?6=&69
  480 bk%?7=tr%
  490 PROCosword(8)
  500 ENDPROC
  510 :
  520 REM Osword &7F routine
  530 DEFPROCosword(J%)
  540 A%=&7F
  550 CALL&FFF1
  560 IF(bk%?J%)<>0PRINTTAB(10,22)CHR$13
1;"Disc error ";bk%?J%:PRINTTAB(10,24)CH
R$131;"Press space":VDU7:X=GET
  570 ENDPROC
  580 :
  590 REM Sets data block for read
  600 DEFPROCrb(F%,G%,H%,K%)
  610 ?bk%=F%:bk%?5=3:bk%?6=&53:bk%?7=G%
  620 bk%?8=H%:bk%?9=K%
  630 PROCosword(10)
  640 ENDPROC
  650 :
  660 REM Main routine
  670 REM inputs filename etc
  680 DEFPROCsearch
  690 ?&81=0:CLS:PRINTTAB(5,5)CHR$134;"D
o you require a printout?":X$=GET$
  700 *FX202,32
  710 CLS:PRINTTAB(5,5)CHR$134;"Input th
e filename";CHR$(131);:INPUTA$:IFLEN(A$)
>7ORA$=""ORLEN(A$)<=0GOTO710
  720 IFLENA$=7GOTO740
  730 REPEAT:A$=A$+" ":UNTILLEN(A$)=7
  740 FORV%=0TO6:?(&70+V%)=ASC(MID$(A$,7
-V%,1)):?(&77+V%)=ASC(MID$(A$,7-V%,1))OR
32:NEXT
  750 PROCscreen
  760 IFX$="Y"OR X$="y"VDU2
  770 VDU14
  780 ?&8D=0:PROCloadit
  790 VDU3
  800 PRINT
  810 VDU26,15
  820 ENDPROC
  830 :
  840 REM Sets up screen
  850 DEFPROCscreen
  860 CLS:IFX$="Y"OR X$="y"VDU2
  870 VDU30:PRINT"       ";CHR$130"D
ISC      FILENAME":VDU3:PRINTTAB(7,24)CH
R$131"SHIFT TO REPEAT";CHR$130;"     ES
CAPE TO MAIN MENU"
  880 VDU28,0,22,39,4
  890 VDU30
  900 ENDPROC
```

Listing III

```
   10 REM Listing 3 "$.CODER"
   20 REM by John Macrae
   30 REM BBC B,B+/128
   40 REM Master 128
   50 REM (c) Micro User
   60 REM Produces and saves
   70 REM Machine code files
   80 DIM s%30
   90 PROCsearchcode
  100 PROCerrcode
  110 PROCsortcode
  120 PROCoscli("SAVE MULTCOD 0900+280")
  130 END
  140 REM
  150 DEFPROCsearchcode
  160 RESTORE290
  170 L%=&900
  180 FORI%=L% TO L%+&18B
  190 READ?I%
```

Turn to Page 140 ▶



◄ *From Page 139*

```
  200 NEXT
  210 SUM%=0
  220 FORI%=L% TO L%+&18B
  230 SUM%=SUM%+?I%
  240 NEXT
  250 IF SUM%<>50630VDU7,12:PRINTTAB(5,5
)"Checksum error — check data 290 - 780"
:END
  260 L%=I%+1
  270 ENDPROC
  280 REM search data
  290 DATA169,0,133,127,133,141,133,142
  300 DATA133,129,230,129,96,169,0,133
  310 DATA127,133,142,165,136,133,138,16
5
  320 DATA137,133,139,165,143,208,2,230
  330 DATA139,24,101,138,133,138,165,139
  340 DATA105,0,133,139,160,0,177,138
  350 DATA208,36,200,177,138,201,12,208
  360 DATA29,165,138,24,105,14,133,138
  370 DATA169,0,101,139,133,139,160,0
  380 DATA177,138,208,7,200,177,138,201
  390 DATA217,240,21,76,1,10,165,138
  400 DATA24,105,2,133,138,169,0,101
  410 DATA139,133,139,160,0,76,44,9
  420 DATA230,142,230,129,230,141,165,13
8
  430 DATA133,132,165,139,133,133,32,137
  440 DATA9,165,141,197,140,176,9,165
  450 DATA142,201,23,240,3,76,44,9
  460 DATA96,165,132,24,105,2,133,132
  470 DATA169,0,101,133,133,133,24,160
  480 DATA217,162,6,136,177,132,201,32
  490 DATA144,27,240,25,181,112,201,42
  500 DATA240,35,177,132,213,112,240,4
  510 DATA213,119,208,9,224,0,240,30
  520 DATA202,136,76,164,9,224,0,240
  530 DATA216,202,136,192,0,240,3,76
  540 DATA189,9,76,103,10,224,0,240
  550 DATA5,136,202,76,205,9,152,72
  560 DATA32,2,10,104,168,132,135,152
  570 DATA105,6,168,177,132,32,238,255
  580 DATA136,196,135,208,246,177,132,32
  590 DATA238,255,169,32,32,238,255,32
  600 DATA231,255,192,0,240,105,76,153
  610 DATA9,96,162,0,160,0,165,129
  620 DATA201,10,144,7,232,56,233,10
  630 DATA76,8,10,133,128,138,201,10
  640 DATA144,7,200,56,233,10,76,22
  650 DATA10,170,169,32,32,238,255,32
  660 DATA238,255,32,238,255,32,238,255
  670 DATA32,238,255,32,238,255,32,238
  680 DATA255,32,238,255,152,105,48,32
  690 DATA238,255,138,105,48,32,238,255
  700 DATA165,128,105,48,32,238,255,169
  710 DATA32,32,238,255,32,238,255,32
  720 DATA238,255,32,238,255,32,238,255
  730 DATA32,238,255,32,238,255,96,165
  740 DATA132,24,105,217,133,132,169,0
  750 DATA101,133,133,133,165,127,201,3
  760 DATA240,5,230,127,76,137,9,169
  770 DATA0,133,127,165,132,133,138,165
  780 DATA133,133,139,96
  790 DEFPROCerrcode
  800 REM Removes "bad" chars
  810 RESTORE920
  820 FORI%=L% TO L%+&3A
  830 READ?I%
  840 NEXT
  850 SUM%=0
  860 FORI%=L% TO L%+&3A
  870 SUM%=SUM%+?I%
  880 NEXT
  890 IF SUM%<>7033VDU7,12:PRINTTAB(5,5)
"Checksum error — check data 920 - 990"
:END
  900 L%=I%+1
  910 ENDPROC
  920 DATA32,158,10,32,181,10,230,129
  930 DATA230,129,32,158,10,32,181,10
  940 DATA96,160,255,177,128,41,127,201
  950 DATA32,176,2,169,32,145,128,136
  960 DATA192,8,240,3,76,160,10,96
  970 DATA160,255,169,13,145,128,136,136
  980 DATA136,136,136,136,136,136,192,15
  990 DATA176,242,96
 1000 DEFPROCsortcode
 1010 REM Sorts files
 1020 RESTORE1120
 1030 FORI%=L% TO L%+&B6
 1040 READ?I%
 1050 NEXT
 1060 SUM%=0
 1070 FORI%=L% TO L%+&B6
 1080 SUM%=SUM%+?I%
 1090 NEXT
 1100 IF SUM%<>23637VDU7,12:PRINTTAB(5,5
)"Checksum error — check data 1120 - 13
40":END
 1110 ENDPROC
 1120 DATA173,4,6,133,123,173,5,6
 1130 DATA133,124,160,0,177,123,133,122
 1140 DATA169,0,133,125,166,122,173,1
 1150 DATA6,133,112,173,2,6,133,113
 1160 DATA160,0,177,112,133,114,200,177
 1170 DATA112,133,115,200,177,112,133,11
6
 1180 DATA200,177,112,133,117,200,177,11
2
 1190 DATA133,118,200,177,112,133,119,20
0
 1200 DATA177,112,133,120,200,177,112,13
3
 1210 DATA121,165,117,197,121,176,5,133
 1220 DATA126,76,33,11,165,121,133,126
 1230 DATA160,0,177,114,209,118,144,62
 1240 DATA208,15,200,196,126,240,2,208
 1250 DATA241,165,117,197,121,144,47,240
 1260 DATA45,160,0,165,118,145,112,200
 1270 DATA165,119,145,112,200,165,120,14
5
 1280 DATA112,200,165,121,145,112,200,16
5
 1290 DATA114,145,112,200,165,115,145,11
2
 1300 DATA200,165,116,145,112,200,165,11
7
 1310 DATA145,112,169,255,133,125,24,165
 1320 DATA112,105,4,133,112,144,2,230
 1330 DATA113,202,240,3,76,233,10,165
 1340 DATA125,240,3,76,217,10,96
 1350 DEFPROCoscli($s%)
 1360 X%=s% MOD &100:Y%=s% DIV &100
 1370 CALL&FFF7
```

Listing IV

```
   10 REM Listing 4 "$.SETUP"
   20 REM BY John Macrae
   30 REM BBC B,B+/128
   40 REM Master Series
   50 REM
   60 REM Configures data files
   70 DIM s%30
   80 allno%=200:TR%=80
   90 CLS
  100 PRINTTAB(5,2)CHR$130;"If this a 40
 track disc press";CHR$134;"4"
  110 X=GET:IF X=52 allno%=92:TR%=40
  120 PRINTTAB(5,5)CHR$(130);"If you hav
e double sided";CHR$(130);"       drives
 press";CHR$(134);"2"
  130 X=GET
  140 IF X=50 ds%=2 ELSE ds%=1
  150 PRINTTAB(5,10)CHR$(130);"Enter the
 drive number"CHR$(130)"       to be cat
alogued (0,1)";
  160 X=GET
  170 IFX<48 OR X>49 GOTO150
  180 PRINT CHR$(X):drive%=X-48
  190 A$=CHR$(134)+"single"
  200 IF ds%=2 A$=CHR$(134)+"double"
  210 CLS:PRINTTAB(2,6)CHR$(130);"This s
ystem is about to be";CHR$(130);"  conf
igured as follows"""  ";CHR$(134);TR%;"
 Track filesize"
  220 PRINT"CHR$(134)"  Disc to be catal
ogued in drive ";CHR$(X)
  230 PRINTTAB(2,15)CHR$(134);"Disc driv
es are ";A$;" sided"
  240 PRINTTAB(2,20)CHR$(130);"IF THIS I
S CORRECT PRESS";CHR$(134);"<SPACE>":Y=G
ET:IFY<>32GOTO60
  260 REM Sets up space on disc to make
"f.file" start at sector &50
  270 PROCoscli("SA.SP 0+FF")
  280 PROCoscli("SA.f.RECORD 0+1")
  290 x=OPENUP("f.RECORD"):PRINT#x,0,ds%
,drive%,allno%
  300 CLOSE#x
  310 PROCoscli("SA.f.EXTRA 0+1F40")
  320 IF allno%<>92 GOTO350
  330 PROCSA(&14000)
  340 GOTO360
  350 PROCSA(&2B800)
  360 CHAIN"$.catalog"
  370 END
  380 DEFPROCSA(A%)
  390 CLS:PRINTTAB(5,10)CHR$(134)"INITIA
LISING DISC"
  400 X=OPENOUT("f.file")
  410 CLOSE#X
  420 X=OPENUP("f.file")
  430 PTR#X=A%
  440 CLOSE#X
  450 ENDPROC
  460 DEFPROCoscli($s%)
  470 X%=s% MOD &100:Y%=s% DIV &100
  480 CALL&FFF7
  490 END
```

This listing is included in this month's tape & disc offer. See order form on Page 167.

Peter Davidson looks at getting free software over the telephone

As easy as falling off a logon . . .

AS we have seen, sending and receiving text using services such as Telecom Gold is very easy. Computer programs are made up of text, so it is not surprising that many electronic mail services, bulletin boards and other communication services now contain software that you can obtain free.

First, a couple of technical terms which keep appearing. We usually refer to software available from remote sources such as Telecom Gold as telesoftware, and the process of getting it from there into your computer as downloading.

Downloading telesoftware from the various sources falls into three main areas, depending whether the system you are using is text (such as MicroLink), viewdata (such as Prestel) or teletext (such as Ceefax).

This month I'm going to concentrate on MicroLink, and among the many programs you'll find there are ones from this and many other issues of *The Micro User*.

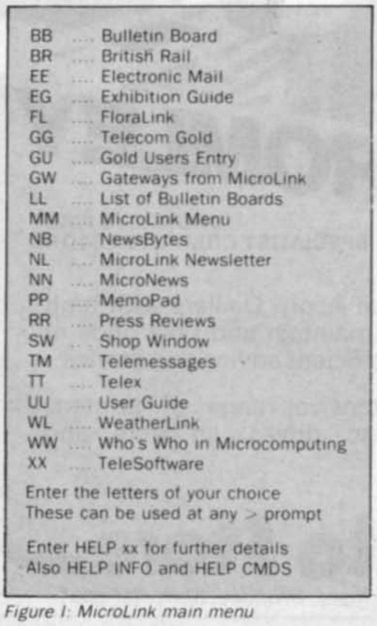
It is very easy to obtain programs from MicroLink. To demonstrate this I'm going to download Ayo, the game from the January 1987 issue of *The Micro User*.

The first thing to do is to logon to MicroLink in the usual way. I'll use Mini Office II, but similar procedures can be followed on most communications software, providing that you use the option for receiving an Ascii file to download the software.

For example, if you are using Commstar, use Load Buffer rather than Receive File, as the latter requires the file that you are getting to be in a different form.

When you are online, if you type MM and look at the main menu (Figure I) you'll see that you can look at the telesoftware section by keying XX.

You are then presented with a menu allowing you to select which computer the software will be for, as shown in Figure II.

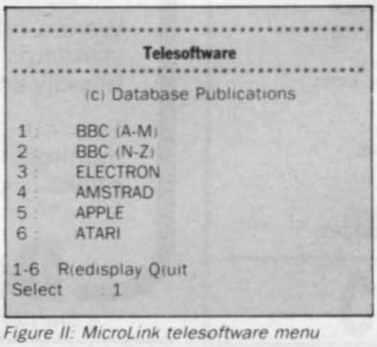


```
BB  .... Bulletin Board
BR  .... British Rail
EE  .... Electronic Mail
EG  .... Exhibition Guide
FL  .... FloraLink
GG  .... Telecom Gold
GU  .... Gold Users Entry
GW  .... Gateways from MicroLink
LL  .... List of Bulletin Boards
MM  .... MicroLink Menu
NB  .... NewsBytes
NL  .... MicroLink Newsletter
NN  .... MicroNews
PP  .... MemoPad
RR  .... Press Reviews
SW  .... Shop Window
TM  .... Telemessages
TT  .... Telex
UU  .... User Guide
WL  .... WeatherLink
WW  .... Who's Who in Microcomputing
XX  .... TeleSoftware

Enter the letters of your choice
These can be used at any > prompt

Enter HELP xx for further details
Also HELP INFO and HELP CMDS
```

Figure I: MicroLink main menu

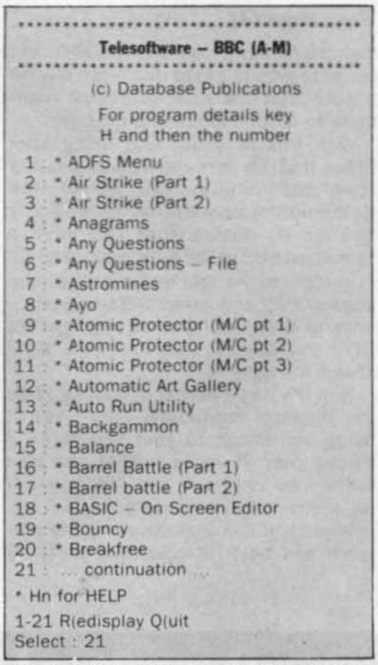


```
*************************************
            Telesoftware
*************************************
      (c) Database Publications

 1 :    BBC (A-M)
 2 :    BBC (N-Z)
 3 :    ELECTRON
 4 :    AMSTRAD
 5 :    APPLE
 6 :    ATARI

1-6  R(edisplay Q(uit
Select    1
```

Figure II: MicroLink telesoftware menu



```
*************************************
     Telesoftware - BBC (A-M)
*************************************
      (c) Database Publications
   For program details key
     H and then the number

 1 : * ADFS Menu
 2 : * Air Strike (Part 1)
 3 : * Air Strike (Part 2)
 4 : * Anagrams
 5 : * Any Questions
 6 : * Any Questions - File
 7 : * Astromines
 8 : * Ayo
 9 : * Atomic Protector (M/C pt 1)
10 : * Atomic Protector (M/C pt 2)
11 : * Atomic Protector (M/C pt 3)
12 : * Automatic Art Gallery
13 : * Auto Run Utility
14 : * Backgammon
15 : * Balance
16 : * Barrel Battle (Part 1)
17 : * Barrel battle (Part 2)
18 : * BASIC - On Screen Editor
19 : * Bouncy
20 : * Breakfree
21 :  .... continuation ....
* Hn for HELP
1-21 R(edisplay Q(uit
Select : 21
```

Figure III: Part of the selection of programs

As the program we want is for the BBC Micro, pressing 1 will take us to the correct section and a list of programs similar to that shown in Figure III will be displayed.

If the program you want is not shown keying 21 will take you to the next screen containing further programs.

It's a good idea to get any extra details and instructions that may not be in the program itself. You do this by selecting H for Help followed by the number of the program.

Ayo is number 8 on this list, so if you type H8 you'll obtain a brief description of the program and any extra instructions necessary.

If it's the one you want, you're ready to download it. Key 8 and you'll be prompted what to do next, as shown in Figure IV.

At this point you have a choice. The aim is to get the program from the MicroLink computer on to a disc or tape, but it is possible to receive it into your computer's memory first. The place where it will go is called the buffer.

If you download into memory first you run the risk of the program being longer

Turn to Page 142 ▶

◀ *From Page 141*

than the memory you have available, so I prefer to go straight to disc – but always ensure that there is sufficient room there to accommodate the program.

With this in mind, and using Mini Office II which uses the disc as a buffer from the minute you select the Communications option unless you change it, ensure that you have a formatted disc in the drive and press f2.

In reply to the prompt for a filename, answer AYO and press Return twice – once to enter the filename and again to fulfil the request you had from Gold shown in Figure IV.

Now it's just a matter of waiting while the program downloads. You'll see it being written on to your screen as it comes over. If you are using the disc buffer, the drive will start occasionally as another section is stored.

When you see that the complete program has been downloaded, press f2 and the final section will be saved to your disc. The program is ready to use so you can log off MicroLink.

You now have the program on disc, but how do you run it?

CHAINing the program will just result in a "Bad program" message. This is because the program is stored in its Ascii rather than tokenised form, just as it would have been if you had SPOOLed it out of your own micro.

What you have to do to load a program you have saved in this way is to use *EXEC followed by the filename, such as:

```
*EXEC AYO
```

You will now see the text appear on your screen, just as if you were typing it.

You may have odd bits at the start or end of the file, depending on the exact points where you opened and closed the buffer. These will generate error messages but they can be ignored.

The same thing can happen when you type in a program. Providing the program itself is correct an odd bit of garbage at the start or end will not affect it.

```
NOW PREPARE YOUR DISKETTE/CASSETTE
TO ACCEPT DATA.
THEN PRESS RETURN WHEN READY
(press RETURN when file transfer
is completed)
```

Figure IV: Message before downloading

Once your program is in memory, save it under a different name such as AYO+, using:

```
SAVE "AYO+"
```

You should then be able to run the program and reload it in the usual way at any time.

As you can see, downloading telesoftware from MicroLink is easy and can save you hours of typing.

● *Next month I'll be looking at some of the other sources of telesoftware, and at the various ways of downloading it.*

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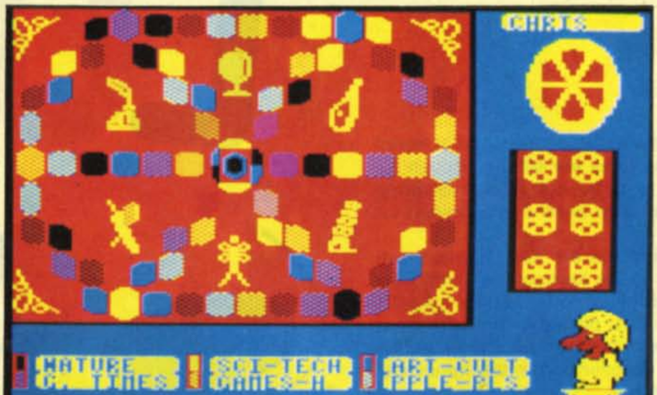

CHRIS, CHOOSE YOUR SQUARE OR 'C' FOR CHART

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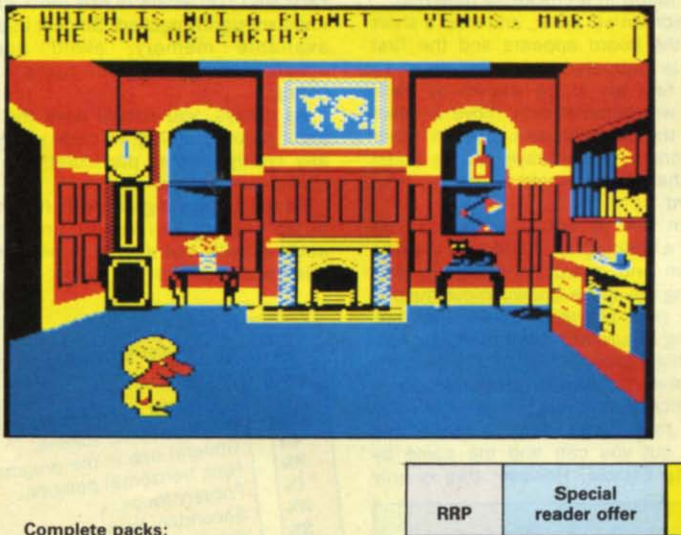
B: ✓ M: ✓

for the BBC Micro



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TO ORDER TURN TO THE FORM ON PAGE 167

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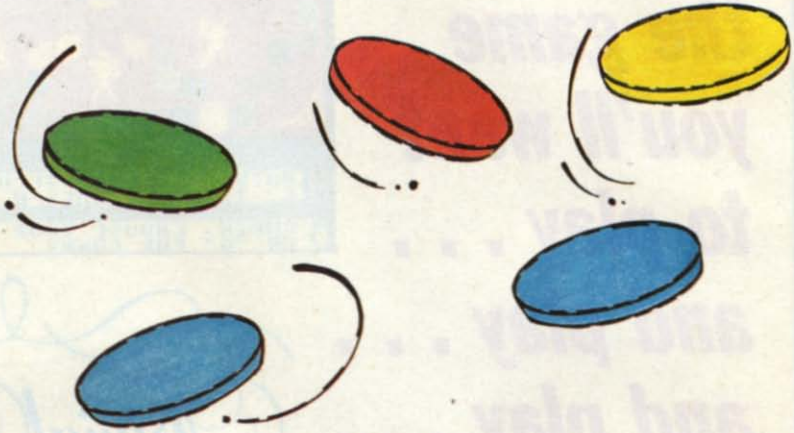
LUDO



LUDO is a version of the popular board game: The rules are simple enough for children to play, but it is frustrating enough to keep anyone entertained for hours.

No complicated key strokes are required, so the keyboard is spared the abuse which arcade games usually impose. But perhaps the greatest advantage of this game is that up to four can play, so everyone in the family can join in the fun.

Any or all of the players can be computer controlled. Computer players make intelligent moves and like to dominate the board, so it is advisable to stay well clear of them.

The board is divided into four coloured areas: Red, blue, yellow and green. Each has four separate divisions – the yard, start square, home run and home triangle. Four tokens sit in each yard and the rest of the board consists of white squares.

The object is to move each token from the yard to the start square, then around the board to the safety of the home run, and finally land on the home triangle. The first player to do this with all four tokens is the winner.

There are rules to make it difficult to achieve this.

The first is that tokens can only move from the yard if a six is thrown on the die, and throwing a six gives a player a free throw.

Each throw determines the number of squares a token can move. More than one token of the same colour can occupy a square, but landing on an opponent's tokens will return them to the yard.

After reaching the home run a token must get home in the exact number of moves. If a throw is too high the token will move towards and on to the home triangle and then backtrack away from it.

When the program is run it will ask who each of the four colours should represent and whether they should be computer players, where the colour is marked with an asterisk. Names are limited to five characters, and spaces are not accepted.

When all the names have been entered players take turns at rolling the die. The one with the highest score has the advantage of starting the game. The others follow in a clockwise direction.

The screen will clear, and after a short delay the board appears and the first player is instructed to roll the die.

The first six to be thrown by each player will automatically move a token on to the start square, but on other occasions a human player will be asked if another token should be moved from the yard.

When two or more tokens can be played a flashing box highlights the first of them and instructions explain that pressing the space-bar will move the box to the next playable token and that pressing Return will move the token currently highlighted.

When all the players have their tokens in the home positions the game is over. It can take some time to reach this stage, but you can end the game by pressing Escape. However this is only effective when at least one player has all four tokens home.

Whichever way the game ends, a table of results will display who finished and in what order.

Disc users can run the program with PAGE=&1100 which is why most of the lines are tightly packed. Since it uses all available memory, avoid adding unnecessary spaces when typing in the listing.

As always, you should save the program before running, in case you make any typing errors, particularly in the shift-down routine.

Running the program with four computer players will report any errors automatically and also demonstrate the rules and tactics of the game.

X%	0	1	2	3	4
0	E	B	B	B	B
1	T	X	X	X	X
2	T	X	X	X	X
3	T	X	X	X	X
4	T	X	X	X	X

B=Tokens moving round board.
E=Empty cell never used.
T=Temporary storage areas.
X=Horizontal position of tokens.

Table I Contents of X%(,) array

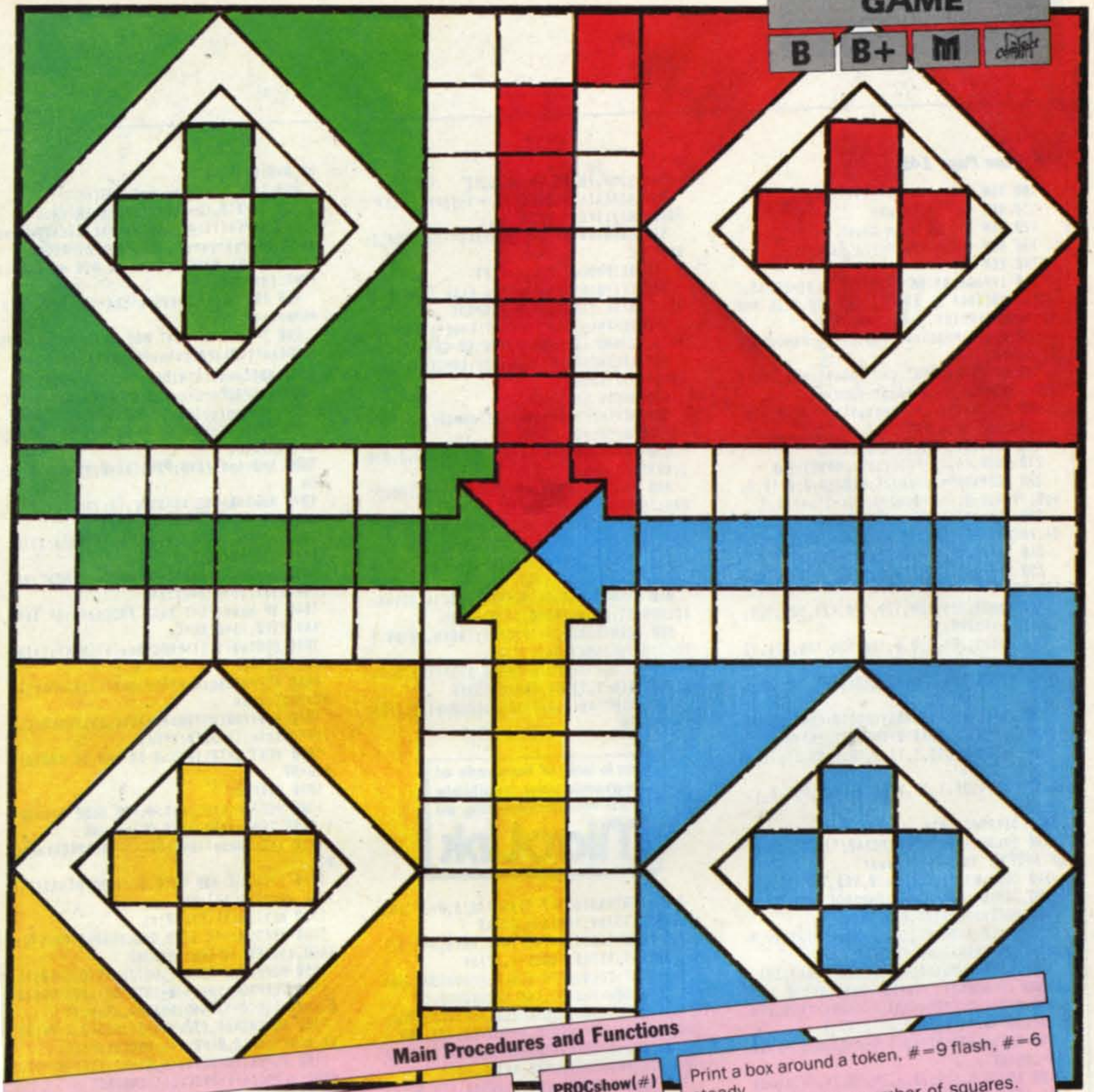
Y%	0	1	2	3	4
0	N	H	H	H	H
1	T	Y	Y	Y	Y
2	T	Y	Y	Y	Y
3	T	Y	Y	Y	Y
4	T	Y	Y	Y	Y

H=Number of tokens home.
N=Total number of tokens home.
T=Type of player.
Y=Vertical position of tokens.

Table II Contents of Y%(,) array

Main Variables

A$	Frame for each square on board.
B$	Block used for tokens.
G$	General use in the program.
H%	Next horizontal position.
J%	Primary loops.
K%	Secondary loops.
S%	Volume control for sound.
V%	Next vertical position.
X%	Actual horizontal position.
Y%	Actual vertical position.
C	Colour of player.
T	Token number.
P$()	Store for the names of players.
X%(,)	Various uses, see Table I.
Y%(,)	Various uses, see Table II.



Main Procedures and Functions

PROCinit	Initialise characters and arrays.
PROCtitle	Draw title page and borders.
PROCwho	Find out who will play and who goes first.
PROCmess	Set up a window and print messages.
FNin	Allow entry of five characters maximum per name.
PROCboard	Draw the board and place four tokens in each yard.
PROCroll	Decide the value of the die and the number of dots.
PROCplayer	Determine which type of player is about to move.
PROCmicro	Look after computer players.
PROCmore	Move another token from yard, computer player only.
PROCtoken	Used by computer player to evaluate which token will move.
PROC6	Move a token from the yard to the start square.
PROCshow(#)	Print a box around a token, #=9 flash, #=6 steady.
PROCaction	Move token a given number of squares.
PROCout	Move token out of a square.
PROCin	Move token into a square.
PROCfig	Print the number of tokens on a square.
PROCcheck	Find out how many players are on a square.
PROCway	Find which way token should go – up, down, right or left.
PROCsafe	Decide if a token is on the home run and set *Safe*.
PROChome	Decide if a token is home and set *Home*.
PROChit	Test to see if anyone should be sent to the yard.
PROCswop	Swop token positions when one is hit or reaches home.
PROCcrunch	Send tokens back to the yard.
PROCbell	Ring the bell, a token is home, check if it's the fourth.
PROCtable	Present the results table.

Full listing starts on Page 146 ▶

◀ From Page 145

```
  100 REM **********************
  110 REM *        LUDO        *
  120 REM *   by John Dewar    *
  130 REM * (c) The Micro User *
  140 REM **********************
  150 IFPAGE>&1100 THEN1790 ELSE*TV255,1
  160 ONERROR IF ERR=17 GOTO210 ELSE MOD
E3:REPORT:PRINT" line ";ERL:END
  170 MODE2:PROCinit:PROCtitle:PROCwho:P
ROCboard
  180 REPEAT:REPEAT:C=C MOD4+1:UNTILY%(C
,0)<4:REPEAT:Home=FALSE:PROCroll
  190 PROCplayer:PROCmess(""):IF N>0 PRO
Caction:IF Home PROCbell
  200 UNTILR<6:UNTILY%(0,0)=16
  210 VDU4,26,12:PROCtable:MODE3:END
  220 DEFPROCinit:VDU23;8202;0;0;0;19,2,
4;0;19,4,2;0;:@%=2:W%=5:S%=-11:*FX4,1
  230 DIM P$(4),X%(4,4),Y%(4,4):FORJ%=1T
O4:FORK%=1TO4:READX%,Y%:X%(J%,K%)=X%*64
  240 Y%(J%,K%)=(32-Y%)*32:NEXT:NEXT
  250 VDU23,224,255,129,129,129,129,129,
129,129
  260 VDU23,225,129,129,129,129,129,129,
129,255:*FX229,1
  270 VDU23,226,0,0,0,126,126,126,126,12
6
  280 VDU23,227,126,126,126,126,126,126,
126,0
  290 A$=CHR$224+CHR$8+CHR$10+CHR$225:B$
=CHR$226+CHR$8+CHR$10+CHR$227:ENDPROC
  300 DATA10,3,13,3,13,9,10,9,13,21,13,2
7,10,27,10,21
  310 DATA4,27,1,27,1,21,4,21,1,9,1,3,4,
3,4,9
  320 DEFPROCtitle
  330 COLOUR130:PRINT'SPC140;TAB(8,2)"LU
DO"''SPC9"by"''SPC5"John Dewar"
  340 COLOUR128:PROCbox(0,992,1279,386):
MOVE0,768:DRAW1279,768:ENDPROC
  350 DEFPROCbox(J%,K%,L,M)
  360 GCOL0,6:MOVEJ%,K%:DRAWL,K%:DRAWL,M
:DRAWJ%,M:DRAWJ%,K%:ENDPROC
  370 DEFPROCwho:COLOUR5:PRINTTAB(2,30)"
RETURN IF NOBODY";:REPEAT:RESTORE510
  380 M=0:L=0:FORC=1TO4:COLOURC:Y%(0,C)=
0:X%(C,0)=0:Y%(C,0)=0:Y%(0,0)=0
  390 READG$:PRINTTAB(5,9+C*2)G$+STRING$
(13-LEN(G$),".")
  400 VDU19,5,5;0;28,2,29,18,24,12:SOUND
1,S%,196,1:PRINT"Who plays ";G$;"?"
  410 P$(C)=FNin:VDU19,5,0;0;12:IFG$=""
Y%(C,0)=4:L=L+4 ELSE M=M+1
  420 IFG$>"":PRINT"Is ";G$;" a"'"compu
ter player? ";:IF FNyn=89 Y%(0,C)=1
  430 VDU12,26:G=9+C*2:PRINTTAB(18-LEN(G
$),G)G$TAB(4,G)MID$(" *",Y%(0,C)+1,1)
  440 NEXT:COLOUR7:PRINTTAB(3,29)"Correc
t? (Y/N)":UNTIL M>1 AND FNyn=89
  450 PRINTTAB(3,29)SPC14:Y%(0,0)=L:PROC
die:L=0:M=0:N=0
  460 REPEAT:FORC=1TO4:IFP$(C)="" OR X%(
0,C)<M THEN490
  470 PROCroll:X%(0,C)=X%(0,C)+R:VDU4:SO
UND1,S%,196,1:PRINTTAB(1,9+C*2)X%(0,C)
  480 IFX%(0,C)=L:N=N+1:ELSE IFX%(0,C)>L
:L=X%(0,C):N=0:P%=C
  490 NEXT:M=L:UNTIL N=0:PROCmess(P$(P%)
+"+goes+first"):VDU4
  500 PROCwait(3):CLS:C=P%-1:ENDPROC
  510 DATA Red,Blue,Yellow,Green
  520 DEFPROCdie:PROCbox(1016,100,1080,3
2):PROCbox(1024,104,1088,36):ENDPROC
  530 DEFPROCmess(G$):G=20:IFLEN(G$)>30:
G=13
  540 VDU4,28,15,27,19,G,12
  550 REPEAT:G=INSTR(G$,"+")-1:PRINT'LEF
T$(G$,G);:IFG<5:PRINT
  560 G$=MID$(G$,G+2):UNTILG=-1:VDU26,5:
ENDPROC
  570 DEFPROCwait(L):*FX21
  580 IFL=0:G=GET:ENDPROC ELSE TIME=0:RE
PEAT UNTIL TIME>L*100:ENDPROC
  590 DEFFNin:G$="":REPEAT:G=GET:IFG>32A
ND G<127AND LEN(G$)<5VDUG:G$=G$+CHR$(G)
  600 IFLEN(G$)>0AND G=127:G$=LEFT$(G$,L
EN(G$)-1):VDUG
  610 UNTIL G=13:=G$
  620 DEFFNyn:REPEAT:G=GETAND&DF:UNTIL G
=89 OR G=78:=G
  630 DEFPROCboard:FORD=1TO7:VDU19,D,0;0
;:NEXT:COLOUR8
  640 PROCmess("Wait+a+while"):VDU4:COLO
UR6:FORD=1TO11:COLOUR129
  650 PRINTTAB(9,D)SPC6;TAB(9,D+1)SPC6:I
FD<7:PRINTTAB(7,D*2-1)A$;TAB(8,1)A$
  660 COLOUR130:PRINTTAB(9,D+18)SPC6:IFD
<7:PRINTTAB(8+D,15)A$
  670 PRINTTAB(9,D+19)SPC6;TAB(14,17)A$:
COLOUR131:PRINTTAB(0,D+18)SPC6
  680 PRINTTAB(0,D+19)SPC6;TAB(6,29)A$:I
FD<7:PRINTTAB(7,D*2+17)A$
  690 COLOUR132:PRINTTAB(0,D)SPC6:IFD<7:
PRINTTAB(D-1,15)A$;TAB(0,13)A$
  700 PRINTTAB(0,D+1)SPC6:COLOUR135:IFD>
6 THEN730
  710 PRINTTAB(6,D*2-1)A$;TAB(8,D*2-1)A$
;TAB(8+D,13)A$;TAB(8+D,17)A$
  720 PRINTTAB(6,D*2+17)A$;TAB(8,D*2+17)
A$;TAB(D-1,13)A$;TAB(D-1,17)A$
  730 NEXT:COLOUR128:GCOL0,1:MOVE384,604
:MOVE568,604:PLOT85,480,508:GCOL0,2
  740 PLOT85,568,416:GCOL0,3:PLOT85,384,
416:MOVE384,604:GCOL0,4:PLOT85,480,508
  750 FORD=0TO576STEP576:PROCbox(D,412,D
+380,32):PROCbox(D,988,D+380,608)
  760 NEXT:MOVE384,604:DRAW568,416:MOVE5
68,604:DRAW384,416:PROCdie
  770 COLOUR7:VDU28,15,11,19,3:PRINT"LUD
O"''"by"''"John"''"Dewar":VDU26,5
  780 FORD=1TO4:FORE=1TO4:MOVEX%(D,E),Y%
(D,E):PRINTA$:NEXT:NEXT
  790 FORJ%=1TO7:K%=J%:IFK%=2:K%=4 ELSE
IFK%=4:K%=2
  800 VDU19,J%,K%;0;:NEXT:ENDPROC
  810 DEFPROCroll:PROCmess(P$(C)+"+press
+space"):PROCwait(Y%(0,C)):GCOL0,6
  820 K%=RND(7)+2:FORJ%=1TOK%:R=RND(6):S
OUND0,S%DIV2,1,1:SOUND0,S%DIV2,0,1
  830 VDU24,1024;36;1072;96;16,26:IFR MO
D2>0 PLOT69,1054,64:PLOT69,1054,68
  840 IFR>1 PROCdot(48,80)
  850 IFR>3 PROCdot(80,48)
  860 IFR=6 PROCdot(64,64):IFJ%=K%:SOUND
1,S%,244,3:SOUND1,S%,196,3
  870 NEXT:PROCwait(2):PROCmess(""):ENDP
ROC
  880 DEFPROCdot(K%,L)
  890 PLOT69,1032,K%:PLOT69,1032,K%+4:PL
OT69,1064,L:PLOT69,1064,L+4:ENDPROC
  900 DEFPROCplayer:T=1:N=X%(C,0):IFR<6A
ND N=0:ENDPROC
  910 G=78:IFR=6AND N=0 PROC6
  920 IFY%(0,C)=1 PROCmicro:ENDPROC
  930 REPEAT:IFR=6AND N+Y%(C,0)<4PROCmes
s("Move+from+yard?"):IF FNyn=89PROC6
  940 UNTIL N+Y%(C,0)=4 OR R<6 OR G=78:I
FN=1:ENDPROC
  950 PROCmess("SPACE+picks+token+RE-+TU
RN+moves+it.")
  960 T=0:REPEAT:T=T MOD N+1:PROCshow(9)
:PROCwait(0):PROCshow(6):UNTILG=13
  970 PROCmess(STRING$(31," ")):ENDPROC
  980 DEFPROCmicro:REPEAT:IFR=6AND N+Y%(
C,0)<4PROCmore:IFG=89 PROC6
  990 UNTIL N+Y%(C,0)=4 OR R<6 OR G=78:I
FN=1:ENDPROC
 1000 D=0:E=0:F%=0:P%=1:Q%=0:R%=0:FORT=1
TON
 1010 Home=FALSE:X%=X%(C,T):Y%=Y%(C,T):P
ROCcheck:IF U%>P%:P%=U%:Q%=T
 1020 PROCshow(9):PROCsafe:IF Safe:X%(0,
T)=1 ELSE X%(0,T)=0
 1030 In=TRUE:FORM=1TOR:PROCway:NEXT:PRO
Ccheck:IFZ%>=D:D=Z%:E=T
 1040 IF Home:F%=T ELSE PROCsafe:IF Safe
 AND X%(0,T)=0:R%=T
 1050 PROCwait(1):PROCshow(6):NEXT:T=FNt
oken:ENDPROC
 1060 DEFPROCmore:PROCstart(C):X%=H%:Y%=
V%:PROCcheck
 1070 D=0:FORE=1TON:X%=X%(C,E):Y%=Y%(C,E
):PROCsafe:IF Safe:D=D+1
 1080 NEXT:G=78:IFZ%>0 OR D=N OR RND(6)=
6:G=89
 1090 ENDPROC
 1100 DEFFNtoken:IFR%>0:=R% ELSE IFD>0:=
E ELSE IFP%>1AND X%(0,Q%)=0:=Q%
 1110 L=0:FORD=1TO4:FORE=1TON:PROCstart(
D)
 1120 IF(D<>C AND Y%(D,0)<4AND H%=X%(C,E
)AND V%=Y%(C,E)):L=E
 1130 NEXT:NEXT:IFL>0:=L
 1140 IFF%>0:=F% ELSE G=0:FORD=1TON:G=G+
X%(0,D):NEXT:IFG=N:=RND(N)
 1150 REPEAT:L=RND(N):UNTIL X%(0,L)=0:=L
 1160 DEFPROC6:D=4-(N+Y%(C,0)):RESTORE30
0:FORM=1TO(C-1)*4+D:READH%,V%:NEXT
 1170 MOVEH%*64,(32-V%)*32:GCOL0,C:PRINT
A$:N=N+1:X%(C,0)=N:T=N:PROCstart(C)
 1180 X%=H%:Y%=V%:X%(C,N)=H%:Y%(C,N)=V%:
PROCin:PROChit:PROCroll:ENDPROC
 1190 DEFPROCstart(G):RESTORE1200:FORJ%=
1TOG:READH%,V%:NEXT:ENDPROC
 1200 DATA512,992,896,480,384,96,0,608
 1210 DEFPROCshow(L):GCOL0,L:MOVEX%(C,T)
,Y%(C,T)-4:PRINTA$:ENDPROC
 1220 DEFPROCaction:X%=X%(C,T):Y%=Y%(C,T
):In=TRUE:FORM=1TOR:PROCout
 1230 PROCway:X%(C,T)=X%:Y%(C,T)=Y%:PROC
in:NEXT:PROChit:ENDPROC
 1240 DEFPROCout:B%=POINT(X%+8,Y%-8):PRO
Ccheck:IFZ%>0:ENDPROC
 1250 IFU%=1:GCOL0,B%:MOVEX%,Y%:PRINTB$
ELSE IFU%>1:U%=U%-1:PROCfig
 1260 ENDPROC
 1270 DEFPROCin:PROCcheck:IFZ%=0:SOUND1,
S%,M*8,1:PROCfig:ENDPROC
 1280 SOUND1,S%,200,1:ENDPROC
 1290 DEFPROCfig:MOVEX%,Y%:GCOL0,C:PRINT
B$:G=0:IFC<3:G=7
 1300 GCOL0,G:MOVEX%,Y%-24:PRINTSTR$(U%)
:ENDPROC
 1310 DEFPROCcheck:U%=0:Z%=0:FORJ%=1TO4:
FORK%=1TO4
```

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Turn to Page 149 ▶

imogen

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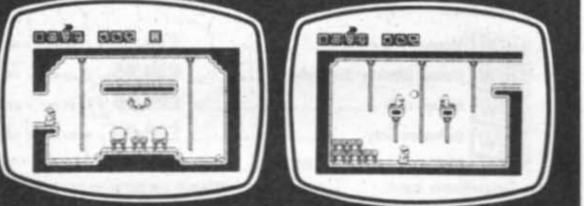

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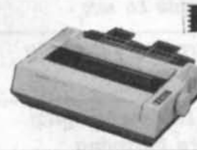

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Is sophisticated, yet simple to use

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The Sideways ROM Board for the new BBC B+ Computer

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Advanced software for the BBC Computer, available in the following combinations.

NEW	**Mouse + Software**	**£48.00** + £1.50 P&P + VAT
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COMPATIBLE WITH AMX MOUSE

- Comprehensive manual.
- Drawing facilities include: Multi point rubber banding, 4 colour shapes for circles, squares, rectangles, elipses, arcs and sectors at any angle and size.
- Drag drawing and air brush facilities with unique area masking.
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- Utilities to use mouse or light pen in your own programs.
- Colour stick fits analogue port, mouse fits to user port and needs 40 or 80 track disc drive.
- Text can be entered in various sizes, fonts and colours.
- Save and load screens to and from disc.

AUTOPROM

Professional EPROM Programmer for the BBC computer and Acorn type Systems.

- Capable of programming all 27 series EPROMS up to 27256 and most 25 series EPROMS.
- Tape or disc based software, including fast program algorithm (27128 in 2 mins) and comprehensive manual.
- Unique facility to run users own basic or machine code programs at Switch on or Reset.

£98.00 + £2.00 P&P + VAT

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Cheques made payable to Advanced Technology Products Ltd. Please allow 28 days for delivery. Cost of carriage or postage refer to each section. Quantity orders and overseas carriage charged at cost. Condition of sales available on request.

VISA

ACCESS/VISA accepted. Carriage to be added to advertised price, then add VAT to the total. In accordance with our policy of progressive development, we reserve the right to modify specifications without prior notice.

◀ *From Page 146*

```
 1320 IFJ%<>C AND X%(J%,K%)=X%AND Y%(J%,K%)=Y%:Z%=Z%+1
 1330 IFJ%=C AND X%(J%,K%)=X%AND Y%(J%,K%)=Y%:U%=U%+1
 1340 NEXT:NEXT:ENDPROC
 1350 DEFPROCway:H%=X%:V%=Y%:IFX%=384 OR(X%=0 AND Y%<608)PROCup
 1360 IFX%=512 OR(X%=896AND Y%>480)PROCdown
 1370 IFY%=608 OR(X%<512AND Y%=992)PROCright
 1380 IFY%=480 OR(X%>384AND Y%=96)PROCleft
 1390 IFPOINT(X%+8,Y%-8)=C AND(X%=448 OR Y%=544)PROCsafe
 1400 X%=H%:Y%=V%:IF M=R PROChome
 1410 ENDPROC
 1420 DEFPROCup:V%=Y%+64:IFV%>992:V%=992:H%=X%+64 ELSE IFV%=480:H%=X%-64
 1430 ENDPROC
 1440 DEFPROCdown:V%=Y%-64:IFV%<96:V%=96:H%=X%-64 ELSE IFV%=608:H%=X%+64
 1450 ENDPROC
 1460 DEFPROCright:H%=X%+64:IFH%=960:H%=896:V%=Y%-64 ELSE IFH%=384:V%=Y%+64
 1470 ENDPROC
 1480 DEFPROCleft:H%=X%-64:IFH%<0:H%=0:V%=Y%+64 ELSE IFH%=512:V%=Y%-64
 1490 ENDPROC
 1500 DEFPROCsafe:Safe=FALSE:H%=X%:V%=Y%
 1510 IFX%=448AND(Y%>96AND Y%<929)OR Y%=544AND(X%>63AND X%<896)Safe=TRUE
 1520 IF(H%=384 OR H%=512 OR V%=608 OR V%=480)AND M>0:In=NOT In
 1530 IFH%>512AND In:H%=X%-64 ELSE IFH%>511AND NOT In:H%=X%+64
 1540 IFH%<384AND In:H%=X%+64 ELSE IFH%<385AND NOT In:H%=X%-64
 1550 IFV%<480AND In:V%=Y%+64 ELSE IFV%<481AND NOT In:V%=Y%-64
 1560 IFV%>608AND In:V%=Y%-64 ELSE IFV%>607AND NOT In:V%=Y%+64
 1570 ENDPROC
 1580 DEFPROChome:IFC MOD2>0 AND X%=448 AND(Y%=608 OR Y%=480)Home=TRUE
 1590 IFC MOD2=0 AND Y%=544 AND(X%=384 OR X%=512)Home=TRUE
 1600 ENDPROC
 1610 DEFPROChit:FORJ%=1TO4:FORK%=1TO4
 1620 IFJ%<>C AND X%(J%,K%)=X%AND Y%(J%,K%)=Y%:PROCwhee:PROCswop:PROCcrunch
 1630 NEXT:NEXT:ENDPROC
 1640 DEFPROCwhee:PROCshow(9):FORL=196TO52STEP-4:SOUND1,S%,L,1:NEXT:ENDPROC
 1650 DEFPROCswop:L=X%(J%,0)
 1660 IFK%<L:FORM=K%TO L-1:X%(J%,M)=X%(J%,M+1):Y%(J%,M)=Y%(J%,M+1):NEXT
 1670 K%=K%-1:X%(J%,0)=L-1:Y%(J%,L)=0:ENDPROC
 1680 DEFPROCcrunch:G=5-(L+Y%(J%,0)):RESTORE300:FORM=1TO(J%-1)*4+G:READH%,V%
 1690 NEXT:MOVEH%*64,(32-V%)*32:GCOL0,6:PRINTA$:SOUND0,S%,6,3
 1700 PROCfig:PROCshow(6):ENDPROC
 1710 DEFPROCbell:FORL=S%TO0:SOUND1,L,196,1:NEXT:J%=C:K%=T:D=X%(C,T)
 1720 E=Y%(C,T):PROCswop:N=Y%(C,0)+1:X%(C,5-N)=D:Y%(C,5-N)=E
 1730 IFN=4:N=W%:W%=W%+1:R=0:PROCmess(P$(C)+"+is+home!"):PROCwait(3):*FX229
 1740 Y%(C,0)=N:Y%(0,0)=Y%(0,0)+1:ENDPROC
 1750 DEFPROCtable:PROCtitle:PRINTTAB(6,9)"POSITION":G$="Sc1st2nd3rd4th"
 1760 FORL=1TO4:COLOURL:M=Y%(L,0)-4:PRINTTAB(4,9+M*2);:IFY%(L,0)<5THEN1780
 1770 IFP$(L)>""PRINTMID$(G$,M*3,3);STRING$(9-LEN(P$(L)),".");P$(L):*FX4
 1780 NEXT:COLOUR7:PRINTTAB(1,29)"Play again?  (Y/N)":IFFNyn=89RUN ELSE ENDPROC
 1790 *KEY0FORK%=0TOTOP-PA. S.4:K%!&1100=K%!PA.:N.|MPA.=&1100|MO.|MRUN|F|M
 1800 CLS:PRINT"PLEASE WAIT.";:VDU21:*FX138,0,128
```

This listing is included in this month's tape & disc offer. See order form on Page 167.

Cut-Price Disks — Lowest Yet!

from only £14.99 for 25 disks delivered to your door

ALL PRICES INCLUDE VAT & DELIVERY TO YOUR DOOR! – NO HIDDEN EXTRAS

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Single sided	or Double sided	Qty
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£ 75.99	£ 85.99	50 disks
£139.99	£159.99	100 disks
£259.99	£299.99	200 disks
£319.99	£365.99	250 disks

Same day despatch – at no extra cost

3M — The BRAND leaders at CASH 'N CARRY prices

Offer 6 – If it's quality, reliability and security then it's 3M. Direct Disk Supplies always give the best price. In fact it's so special that the minimum quantity is 20 disks.

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Remember VAT & Delivery are included – No extras from DDS

Official orders very welcome.

Cash 'n Carry prices on disks from Direct Disk Supplies

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Reversible Media Life

floppy disks complete with 2 notches and two index holes. Again, packed in complete sets of 25 disks.

£ 18.99 – 25 disks
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Use coloured disks to code your files. Buy our rainbow pack of 5 different coloured 'Universal' disks. Without doubt the best value in quality and price.

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FREE CATALOGUE and full price list. Call now for your issue.

Computers

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Complete With Internal Software	£420.00
Master Turbo Upgrade	£113.95
Master Econet Module	£46.00
Master ET	£373.75
Master 512 Upgrade	£217.35

The Master 512 upgrade board incorporates the Intel 80186 processor, plus 512K bytes of RAM. Digital Research DOS+, which is copatible with both MS/DOS version 2, and CP/M 86, allows you to run a large proportion of the most useful programs available. A dual 80 track disc drive is required to run programs on the 512. Provided free with 512 upgrade board are three GEM packages, GEM Desk Top, GEM Write, GEM Paint.

NEW

UNIVERSAL SECOND PROCESSOR

This allows you to connect co-processor boards designed for the Master Series to your BBC Models B or B+. Fitting a Turbo board boosts the BBC's already rapid performance to twice the speed of the standard processor. Fitting the 512 co-processor converts the BBC micro into a 16 bit machine, opening up new possibilities within the world of MS-DOS and CP/M 86. **£86.25**

Eprom Cartridge	£14.95
Reference Manual Part I	£14.95
Reference Manual Part 2	£14.95
Acorn Prestel Adaptor	£125.00
Acorn Teletext Receiver	£135.00

NEW

FILESTORE

Filestore provides shared access to file and printer services on Econet. The filestore consists of two units – a dual 3.5 inch floppy disc unit 1.2 Mbytes of storage (Filestore EO1) which can be expanded with a high performance 20 Mbyte Winchester disk drive unit(Filestore E20).

FILESTORE EO1	£952.00
FILESTORE E20	£829.00

ECONET ACCESSORIES

100m Cable	£89.00
Station Lead Set	£29.00
Econet Starter Kit	£99.00
Econet Bridge	£199.00
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Level 2 Filesaver 80 Track	£235.00
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BBC Upgrades

64K Upgrade Kit	£39.95
17/70 Upgrade Kit	£49.94
ADFS ROM	£29.95
Disc Upgrade Kit	£65.00
Econet Upgrade Kit	£49.00
DNFS ROM	£20.00

NEW

MASTER COMPACT LANGUAGES

Comal, Lisp, Iso-Pascal and Micro-Prolog are now available for use on the MAster 128 and the Master Compact.

COMAL	£49.85
LISP	£29.95
ISO-PASCAL	£69.00
MICRO-PROLOG	£79.95

WORD PROCESSING SPECIAL PACKAGE

PACKAGE 1

Based on Master 128. The Twillstar All in One Word Processing Package contains a Master 128, View 3.0, Viewsheet, High Res Green Monitor, 800K Dual Drives with PSU, Quendata Daisy Wheel Printer together with a box of Discs, Paper, and all the Cables. **£899.00**

PACKAGE 2

Based on Master Compact 128. The Twillstar package includes Compact 128, latest version of the View Word processor, single 640K disk drive, monochrome monitor, correspondence quality printer. All connecting cables for above and also 5 disks and some paper. **£635.00**

BBC MASTER COMPACT

Twillstar continues to offer the MASTER COMPACT for your Home Education and Business needs! Complete with bundled software and an integral 3.5" Disk Drive in the following Systems:-

SYSTEM 1 (inc. VAT) **£414.00**
128K *Single 640K Drive* *UHF Modulator* *Bundled Software*

SYSTEM 2 (inc. VAT) **£488.75**
As System 1. With *12" High Res. Monochrome Monitor*

SYSTEM 3 (inc. VAT) **£626.75**
As System 1. With *14" Medium Res. RGB Monitor*

SPECIFICATIONS: ★ Compatible with Master Series micro subset ★ 128K RAM inc 64K sideways RAM ★ 64K ROM inc 32K MOS, 16K BASIC ★ Up to 4 internal ROM sockets ★ 3.5" 640K formatted disk drive ★ OUTPUTS: Video/RGB/Printer/ Mouse or Joystick ★ Disk drive ★ (optional) Econet ★ Serial ★ 5V power from disk drive module ★ Usual 8 BBC disply modes inc. Mode 7 ★**BUNDLED SOFTWARE**: Pull down menus * Desk top inc. note pad, calculator * VIEW 3.0 * CARD INDEX * Full LOGO * BBC BASIC 4.0 * ADFS + Utils * Welcome suite * Tutorials * (1770 DFS under licence)

2nd DRIVE KIT	£113.00

Monitors

MONOCHROME MONITORS

Phillips BM 7502 Green Screen	£79.00
Phillips BM 7522 Amber Screen	£95.00
Kaga KX 1202G Hi Res Green	£120.00
Kaga KX 1203G Ultra Hi Res Amber	£120.00

Hantarex H x 12 Dark Gloss Screen high resolution monochrome monitor 12" Composite Video & Audio input **£75.00**

COLOUR MONITORS

Microvitec 1431 Std Res	£201.25
Microvitec 1451 Med Res	£255.00
Microvitec 1441 Hi Res	£391.00
Microvitec 2030 Cs 20 Std Res	£425.50
Microvitec 1431 AP Std Res	£224.25
Microvitec 1451 Ap Med Res	£293.25

Phillips CM 8533 Med Res monitor with dark glass etched screen composite video input RGB and Audio Input. **£289.00**

Taxan Super Vision 620

Higt. Resolution colour monitor with several unique features, at an affordable price.

SUPERVISION 620

12" RGB High resolution colour monitor. Fully compatable with IBM, Apple, BBC and most other Personal Computers. 635 x 312 line resolution. Positive or negative sync input. Text colour switchable to green, amber, white or blue or inverse white. Super high contrast tube. Optional tilt-swivel base (with clock/calendar available). Special introductory offer. **£299.00**

PHILIPS MONITOR TO TV CONVERTER

£69.00

HOW TO TURN A DEDICATED MONITOR INTO A FIRST CLASS TV SET?

SIMPLY SLIDE THE SWITCH ON THE TV TUNER.

The Philips AV 7300 TV tuner turns any colour monitor (with CVBS and audio inputs) into a first class TV set, giving you extra versatility and value from your monitor. A convenient TV/computer switch allows the tuner to stay permanently connected to the computer and at the same time to a TV antenna.

OUTSTANDING PERFORMANCE
OUTSTANDING VALUE

Just released by Hantarex 14" Colour Monitor Standard Resolution RGB PAL Audio Input (Inc. VAT) **£175.00**

SPECIAL OFFER

Mitsubishi 1404 Medium Resolution Monitor with 640 X 200 Pixels RGB available with IBM or BBC Leads. **£229.00**

SWIVEL BASE

Tilt and swivel base for 12" or 14" monitor or TV. "Looks very elegant" **£17.25**

Disc Drives

MITSUBISHI DISC DRIVES

User Friendly Disk Drives 100% BBC compatible slimline disc drives. All drives are supplied complete with formatting diskette, comprehensive users manual and all necessary cables. All drives are 40/80 Track switchable at the front and have two years warranty.

5¼" Drives without P.S.U.

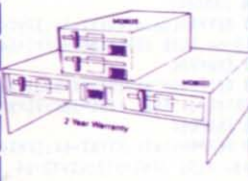
MD 400A Single 400K Double Sided	£118.00
MD 802C Dual 400K Double Sided	£219.00

5¼" Drives with P.S.U.

MD 400B Single 400K Double Sided	£135.00
MD 802E Dual 400K Double Sided	£249.00

SPECIAL

MD 802D Dual 400K Drives horizontally mounted in a monitor stand to fit both the BBC B and the Master series. **£269.00**



Printer Buffer

Now available

Taxan Multipurpose Type Printer Buffer KIF-4308 compatible with any Centronics interface printer **£149.00**

GENERAL COMPUTER ACCESSORIES

MODEMS EPROMS
Components and spare parts
Joysticks
Disk storage boxes
Dust covers
and lots more

The latest range of Software
Business Education
Games
All in stock, Call for details

NEW

MASTER OVERVIEW

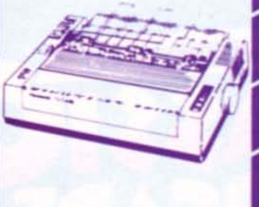
This package allows Master 128 owners (who already benefit from VIEW and Viewsheet) to add the rest of the VIEW family with the purchase of only one package. Overview is a sophisticated combination of ViewSpell and ViewStore on ROM Cartridge and ViewPlot, ViewIndex and Printer Driver Generator on Disk. MASTER OVERVIEW **£98.90**

YOUR ONE STOP MEGA-COMPUSTORE FOR HOME, EDUCATION & BUSINESS NEEDS!

Printers

NEW PANASONIC NEW

Panasonic KX-P1081 Just released the faster and enhanced KX-P1081. 120 cps in draft mode. 24 cps in NLQ mode. Fully Epson RX80 and IBM Matrix and Graphics Printers compatible. Standard friction and tractor feed. Operator accesible print mode switch. Standard 8 bit parallel interface. RS232 interface is optional **£179.00**



Juki 5510

- Gives you 180 CPS & NLQ Standards £269.00

...and thats not all! The Juki 5510 also has full graphics mode, two position 'dip-switch' (providing instant compatibility with both the Epson and the IBM Graphic Printer). Standard 2K memory (expandable to 14K) built-in Parallel Centronics interface and 8-switch international character sets. If you need colour too, the optional Juki 5510 Colour Kit gives you seven colours. **£112.00**

EPSON PRINTERS

Epson FX 800 and FX 1000 range offers superior printing and technical features. 200 cps in draft and 40 cps in NLQ. Complete with tractor and friction feed as standard. Offering IBM compatibility, full graphics. Also includes two NLQ fonts, 10,12,17 and 20 cpi, double height and double width with 8K buffer built in.

FX 800	**£369.00**
FX 1000	**£499.00**
FX 800 Sheetfeeder	**£141.00**
FX 1000 Sheetfeeder	**£163.00**

Epson EX 800/1000 High speed printers. 300 cps in 12 cpi mode. Also offers four colour printing.

EX 800	**£465.00**
EX 1000	**£545.00**
Colour option for both	**£62.00**

CANON 55A

Wide version. Fully IBM compatible. **£399.00**

CANON PW1080A

80 column printer with 160 cps draft and 40 cps NLQ with built in friction and tractor feed. Fully compatible with Epson FX80. Standard parallel interface. **£235.00**

FAST REPAIR SERVICE

In house service department
Repairs for computer printers and disk drives. Call
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and ask for our engineering depatment.

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NEW SHOWROOM
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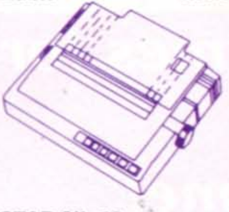
STAR NB15

Outstanding print quality at 300 cps in draft mode and immaculate 24 pin Letter Quality at 100 cps. Fully featured front control panel. Centronics parallel or RS232 serial interface **£856.75**



STAR NL-10

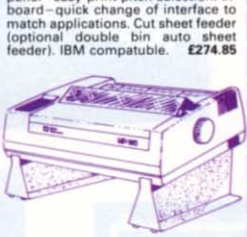
Fine Near-Letter-Quality, 100% compatibility and total reliability all in one easy to use printer. For quality, ease of operation and dependability, nothing beats the Star NL-10. You get outstanding print quality at 120 cps in draft mode and 30 cps in near letter quality. Plus, the sleek NL-10 offers full compatibility with most popular computers through plug in interface cartridges. Just insert the appropriate plug in interface cartridge for your IBM-PC, Commodore, Apple IIc or other parallel computer and your Star NL-10 is ready to print. Touch a button on the control panel to set the print pitch (3 choices), to select the typeface and to print in either draft or NLQ mode. You can even set left and right margins, make top of form settings and control forward and reverse feed in the smallest pitch. **£229.00**

STAR NX-15

Same as Star NL-10 but with 136 column width. Both Epson and IBM compatible **£399.00**

MP200

200 cps in draft. 40 cps in NLQ mode. 7K buffer as standard (128 downloadable characters in NLQ) optional 8K memory. IC font cards. Auto insert–Loads paper automatically to top of form. User friendly control panel–easy print pitch selection. I/F board–quick change of interface to match applications. Cut sheet feeder (optional double bin auto sheet feeder). IBM compatuble. **£274.85**

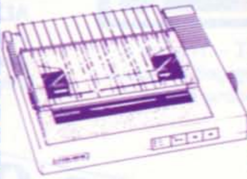


MP201

Same as MP200 with 136 columns **£318.55**

MICRO P MP165

80 Columns. 165 cps in draft mode. 35 cps in NLQ mode. Ultra high resolution graphics. Friction and traction feed. Compatible with all major micros. Quiet and easy to use. 2 Year warranty. Epson or IBM compatible control codes. **£199.00**

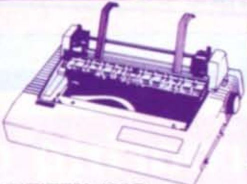


CITIZEN MSPIOE

The new MSPIO with 160 CPS Draft and 40 CPS NLQ. With TWO years Warranty **£269.00**

CITIZEN MSP-15E

17" Wide carriage . 136 column, operating at 160 cps and at the push of a switch will print near letter quality at 40 cps. Fully Epson and IBM compatible. 8k of standard buffer built in. Standard Centronics are optional RS232 **£379.00**



CITIZEN 120D

Dot Matrix Printer. The 120D precision printer brings to the small business, educational and home user good quality and attention to detail. Its compact size, host of standard features and built in quality and reliability that supports Citizen's unique **full TWO-YEAR warranty** make it a must for all computer users. Fast draft output: 120 cps. Built-in NLQ: 25 cps. IBM and Epson compatible. Plug-in interface cartridge. Tractor and friction feed as standard. Optional cut sheet feeder. **£179.00**

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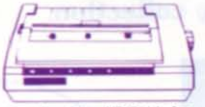
The Complete Solution

INTRODUCES THE NEW
TECO VP1814



Dot matrix printer. VP1814 is fast highly reliable and easy to operate.
☆ Standard 80 column
☆The high-speed, low energy consumption 9 wire dot head gives printing speed of 189 cps and NLQ speed 36 cps
☆Bi-directional, Logic seeking in text mode
☆The use of fan-fold, roll or cut-sheet paper is possible with adjustable sproket pin feed and friction feed
☆Offers emphasized, double print, super script, sub script
☆Justified print mode are also available including left, centre, right and full justification
☆9 graphic modes are available
☆Both download and inprint buffer can exist simultaneously
☆7K input buffer standard can be expanded to 15K
☆Print'ng modes selectable at front panel (NLQ/draft, Pica/Elite, enlarge, emphasize, condense, italic
☆11 Language international character font is internalized
☆Both IBM and Epson compatable

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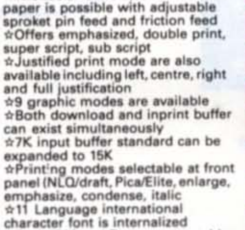
DAISYWHEEL



PANASONIC KX-P3131

A Fully Formed Serial Impact Daisywheel printer with print speed of 17cps. Diablo compatible print wheels. Print pitches available are: 10, 12, 15 and proportional spacing. Standard friction feed and optional tractor. Paper width 13.5 inches. Standard Centronics optional RS-232C. Built with 6K text buffer expandable to 32K buffer. **£249.00**

STAR POWER TYPE

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BROTHER HR 20

The new Brother Daisywheel HR 20 8K standard buffer upgradable to 16k. Comes standard with serial and parallel port **£369.00**

DAISYWHEEL PRINTERS

QUENDATA DWP 1120
with optional tractor/sheet feeder and 13" paper width facility. This Daisywheel printer with 20 CPS has 96 character printwheel compatible with the QUME. Standard centronics interface.

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Fits nearly any width of printer. Allows paper storage and gives ideal viewing position. Can also be used for computers and monitors. Steel construction prevents bending or buckling **£18.00**

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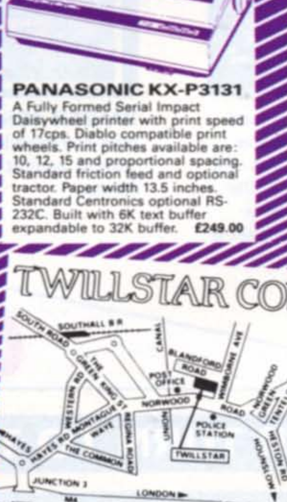

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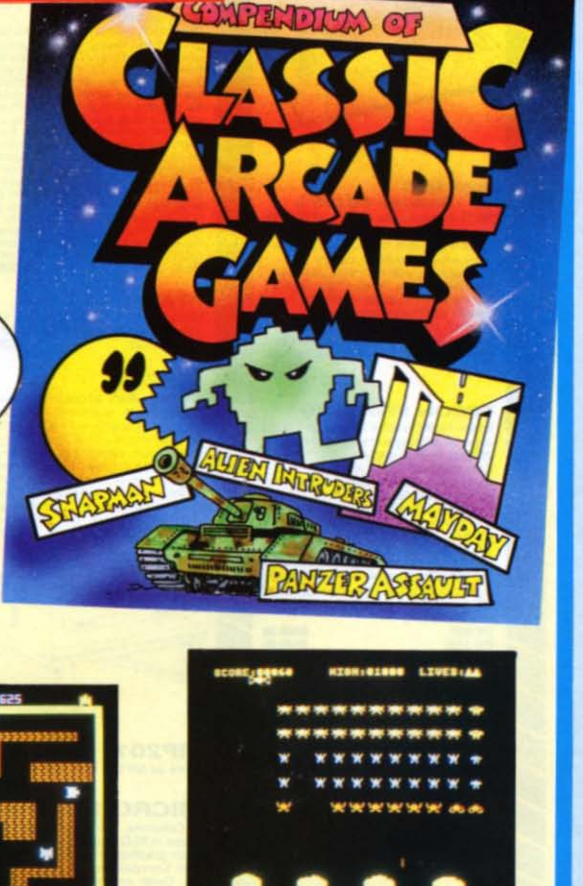

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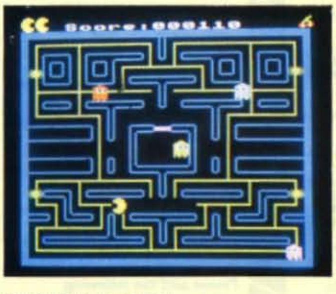

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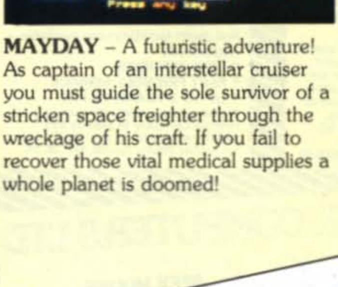
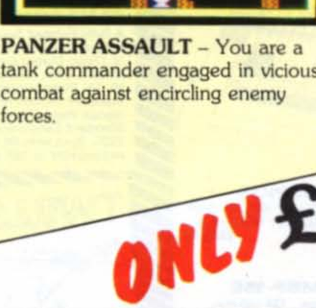
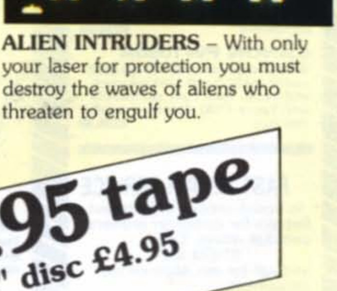


```
Mayday!
Location: Bridge
Contents: CYBERPILOT  DISK PACK

Exits:
  AFT
  PORT

*HELP ALL

FORWARD  AFT  PORT  STARBOARD  ACTIVATE
 BACK  BLAST  CLOSE  CYCLE  DROP  DRILL
 DOCK  ENTER  EAT  EXIT  GET  GO  HELP
HOW  INVENTORY  INSERT  LAUNCH  LEAVE  L
OCK  LOOK  MOVE  OPERATE  OPEN  QUIT  RE
MOVE  REST  SHOOT  SLEEP  SWALLOW  TAKE
 TELEPORT  USE  UNLOCK  WEAR
              Press any key
```

MAYDAY – A futuristic adventure! As captain of an interstellar cruiser you must guide the sole survivor of a stricken space freighter through the wreckage of his craft. If you fail to recover those vital medical supplies a whole planet is doomed!



PANZER ASSAULT – You are a tank commander engaged in vicious combat against encircling enemy forces.



ALIEN INTRUDERS – With only your laser for protection you must destroy the waves of aliens who threaten to engulf you.

ONLY £3.95 tape

5¼" disc £4.95

TO ORDER TURN TO THE FORM ON PAGE 167

The most adventurous and original way to test your French ever devised.

FRENCH on the RUN!

The adventure game with a big difference.

£9.95 cassette
£11.95 5¼" disc

You're on your own in Occupied France — facing the toughest test that a British pilot has ever had to experience!

The year is 1943. As an RAF officer stranded in Occupied France you have one aim – to get back to Britain.

The only way to do this is to try to pass as a Frenchman, but if your French isn't good enough you risk capture and interrogation by the police or even the Gestapo.

Even the simplest tasks – from buying food to taking buses – place you at risk. And to add to your problems you've got limited funds: "Should I hitch a lift or take the train?", "Do I sell my belongings or get a job?"

Whatever you decide to do, time is short. And there are always people willing to denounce you . . .

French on the Run is that rare combination: A truly educational program that's also a thoroughly enjoyable game. This text adventure not only tests your grammar and vocabulary, but your knowledge of France and the French way of life.

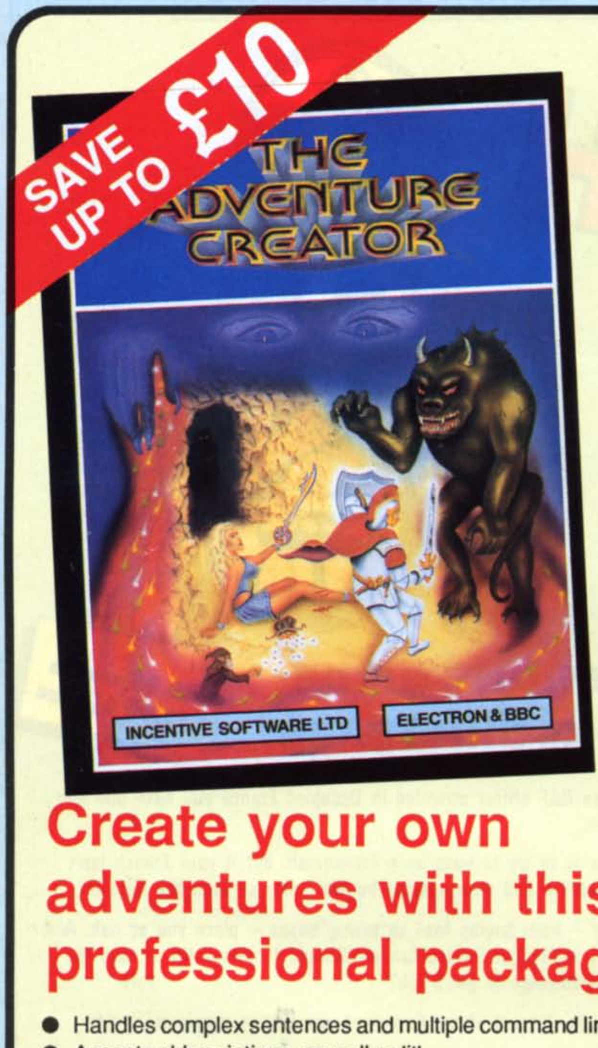
And as your French improves the language problems get harder and the situations become progressively more dangerous. There are four routes to complete in sequence – you need the password from the last before attempting the next. The standard of French required is about O level, though on the last route it rises to just below A level.

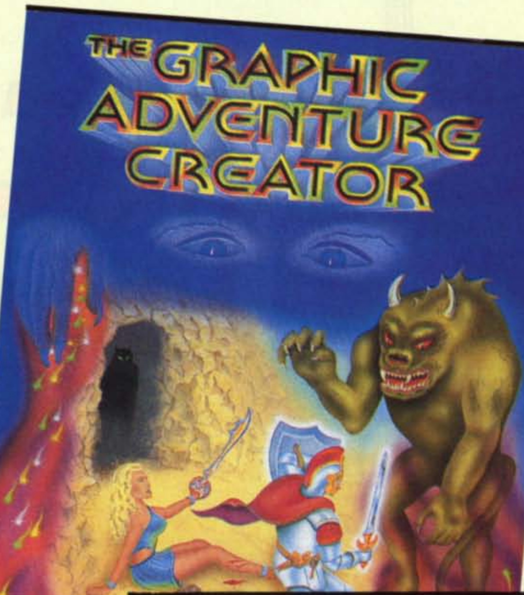
And there's a chance for you to try out the French you'll learn in practice: We are offering a FREE WEEKEND IN PARIS as a prize to the first person to get back to England alive, having broken a code near the end of the final route.

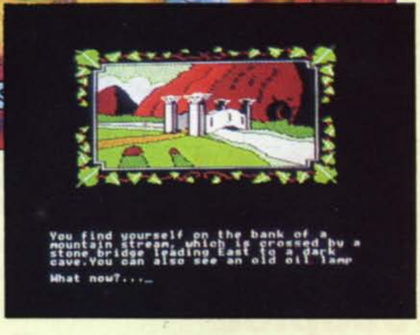
For teachers: *French on the Run uses multi-choice questions with randomised distractors, all carefully chosen to illustrate linguistic points or points concerning things French. The program is meant for individual assessment, but can be used just as effectively for classroom work. A sealed envelope contains details of how the secret passwords are created.*

DATABASE SOFTWARE

TO ORDER TURN TO THE FORM ON PAGE 167







```
You find yourself on the bank of a
mountain stream, which is crossed by a
stone bridge leading East to a dark
cave.You can also see an old oil lamp

What now?...._
```

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- Accepts abbreviations, as well as 'it'
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- Produce massive multi-loading adventures using the Chain command
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B+ ✓
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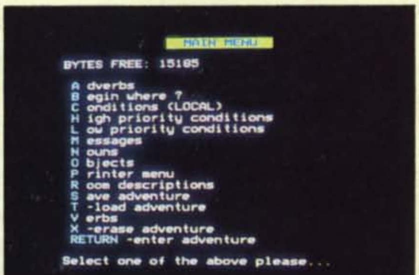

```
              MAIN MENU
BYTES FREE: 15185

 A dverbs
 B egin where ?
 C onditions (LOCAL)
 H igh priority conditions
 L ow priority conditions
 M essages
 N ouns
 O bjects
 P rinter menu
 R oom descriptions
 S ave adventure
 T -load adventure
 V erbs
 X -erase adventure
 RETURN -enter adventure

Select one of the above please...
```

Suitable for	Product	Format	RRP	Special reader offer	YOU SAVE	Offer including subscription	YOU SAVE
B, B+	Graphic Adventure Creator	Tape	£22.95	£17.95	£5	£27.95	£10
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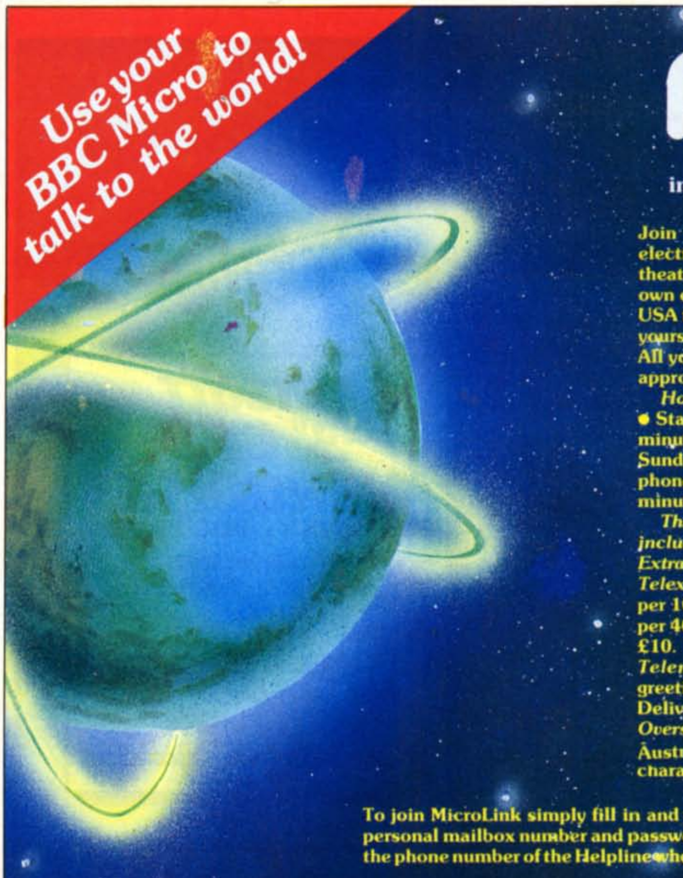
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Allow 7 days for validation of mailbox ☐☐ 19 ☐☐

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◀ *From Page 115*

```
  100 REM      DUCK!
  110 REM  by Billy Newell
  120 REM (C) The Micro User
  130 PROCreloc(&E00)
  140 MODE 1:skulls=9
  150 DIM SX%(skulls),SY%(skulls),C%(sku
lls)
  160 PROCtitle:Z%=RND(-TIME)
  170 VDU23,1,0;0;0;0;0;
  180 VDU19,7,3;0;:CC=4:CY=2
  190 ENVELOPE1,1,1,-8,11,111,84,11,86,-
10,-2,-2,126,126
  200 ENVELOPE2,133,8,4,8,3,1,1,126,0,0,
-10,126,0
  210 ENVELOPE3,129,0,8,0,2,6,6,60,0,0,1
,126,126
  220 ENVELOPE4,3,0,0,0,1,1,1,120,-5,-5,
-10,120,90
  230 VDU23,224,7,15,30,30,30,14,15,7,23
,225,224,48,248,144,144,56,254,192,23,22
6,31,54,46,53,59,31,32,124,23,227,240,24
8,236,244,240,224,64,120
  240 VDU23,228,7,12,31,9,9,28,127,3,23,
229,224,240,120,120,120,112,240,224,23,2
30,15,31,55,47,15,7,2,30,23,231,248,108,
116,172,220,248,16,120
  250 VDU23,232,15,28,55,55,63,31,31,3,2
3,233,240,248,252,252,252,248,248,192,23
,234,12,63,127,254,189,126,31,48,23,235,
48,252,126,191,221,190,252,6
  260 VDU23,236,7,15,30,30,30,14,15,3,23
,237,252,50,255,147,147,60,255,192,23,23
8,28,63,59,59,60,159,227,118,23,239,48,2
48,220,188,188,123,102,182
  270 VDU23,240,15,25,55,53,53,19,31,3,2
3,241,240,152,236,172,172,200,248,192,23
,242,12,63,127,255,191,127,31,48,23,243,
48,252,254,255,253,126,252,6
  280 VDU23,245,128,195,47,31,59,49,117,
113,23,246,1,195,244,248,220,140,174,142
,23,247,127,63,15,5,18,39,71,195,23,248,
254,252,240,64,168,228,226,195
  290 VDU23,249,0,4,6,35,49,24,76,102,23
,250,126,119,51,27,159,231,99,177,23,251
,51,27,76,46,147,169,196,240,23,252,24,1
40,196,96,48,144,192,0
  300 VDU23,244,0,32,4,64,1,7,143,63,23,
253,32,1,8,128,128,228,240,252,23,254,11
9,233,247,117,49,137,239,113,23,255,238,
151,239,174,140,147,246,198
  310 A$=CHR$224+CHR$225+CHR$10+CHR$8+CH
R$8+CHR$226+CHR$227
  320 B$=CHR$228+CHR$229+CHR$10+CHR$8+CH
R$8+CHR$230+CHR$231
  330 C$=CHR$232+CHR$233+CHR$10+CHR$8+CH
R$8+CHR$234+CHR$235
  340 D$=CHR$236+CHR$237+CHR$10+CHR$8+CH
R$8+CHR$238+CHR$239
  350 E$=CHR$240+CHR$241+CHR$10+CHR$8+CH
R$8+CHR$242+CHR$243
  360 F$=CHR$245+CHR$246+CHR$10+CHR$8+CH
R$8+CHR$247+CHR$248
  370 G$=CHR$249+CHR$250+CHR$10+CHR$8+CH
R$8+CHR$251+CHR$252
  380 H$=CHR$244+CHR$253+CHR$10+CHR$8+CH
R$8+CHR$254+CHR$255
  390 lives=3:score=0:target=0:time=950
  400 PROCgrid:dead=0:REPEAT
  410 IF NOTdead target=target+5:fish=0
  420 VDU19,1,CC;0;19,2,CY;0;
  430 FOR S%=1 TO skulls:SX%(S%)=26
  440 C%(S%)=3:IF RND(2)=1 C%(S%)=C%(S%)
*-1
  450 SY%(S%)=1+3*S%:NEXT
  460 DX%=5:DY%=16
  470 dead=FALSE:skull=1
  480 COLOUR7:PRINTTAB(DX%,DY%)A$
  490 REPEAT PROCplace-fish
  500 REPEAT PROCduck
  510 PROCskulls(skull)
  520 skull=(skull MOD skulls)+1
  530 PROCupdate
  540 IF INKEY-17 THEN*FX210,1
  550 IF INKEY-82 THEN*FX210,0
  560 UNTIL eat-fish OR dead
  570 UNTIL dead OR fish=target
  580 IF dead PROCdie ELSE PROCbonus
  590 UNTIL lives=0:PROCendgame
  600 RUN
  610 DEF PROCduck:LOCAL x%,y%,d$
  620 IF INKEY-67 IF DX%<30 x%=3:d$=A$
  630 IF INKEY-98 IF DX%>5 x%=-3:d$=B$
  640 IF INKEY-73 IF DY%>4 y%=-3:d$=C$
  650 IF INKEY-105 IF DY%<28 y%=3:d$=E$
  660 IF d$="" ENDPROC
  670 J%=FNat(DX%+x%,DY%+y%)
  680 COLOUR 0:PRINTTAB(DX%,DY%)d$
  690 DX%=DX%+x%:DY%=DY%+y%
  700 COLOUR 7:PRINTTAB(DX%,DY%)d$
  710 IF J%=2 eat-fish=TRUE:score=score+
target
  720 IF J%=3 dead=TRUE
  730 ENDPROC
  740 DEF PROCgrid
  750 VDU4,26,20,12,23;8202;0;0;0;
  760 VDU19,1;0;0;19,2;0;0;:COLOUR 3
  770 PRINTTAB(14,1)"Please Wait"
  780 GCOL0,1
  790 FOR H%=136 TO 1096 STEP 96
  800 FOR V%=136 TO 942 STEP 96
  810 MOVE H%,V%:DRAW H%,V%-78
  820 MOVE H%+15,V%:DRAW H%+15,V%-78
  830 NEXT:NEXT
  840 FOR H%=136 TO 1000 STEP 96
  850 FOR V%=136 TO 942 STEP 96
  860 MOVE H%+15,V%:DRAW H%+96,V%
  870 MOVE H%+15,V%-84:DRAW H%+96,V%-84
  880 NEXT:NEXT
  890 MOVE136,918:DRAW136,40
  900 DRAW1110,40:DRAW1110,918
  910 DRAW136,918:GCOL 0,1
  920 MOVE 135,5:DRAW 135,28
  930 DRAW 1115,28:DRAW 1115,5
  940 DRAW 135,5
  950 PRINTTAB(14,1)SPC12;
  960 GCOL0,7:MOVE150,20
  970 DRAW 150+time,20
  980 MOVE150,17:DRAW1100,17
  990 MOVE150,14:DRAW1100,14
 1000 X%=100:GCOL0,7
 1010 FORX%=140TO1084STEP64
 1020 MOVEX%,992:DRAWX%+16,1023
 1030 DRAWX%+32,992:MOVEX%+32,992
 1040 DRAWX%+48,1014:DRAWX%+64,992
 1050 MOVEX%,959:DRAWX%+16,931
 1060 DRAWX%+32,959:MOVEX%+32,959
 1070 DRAWX%+48,938:DRAWX%+64,959
 1080 MOVE140,992:DRAW140,960
 1090 MOVE1100,992:DRAW1100,960
 1100 NEXT:COLOUR1
 1110 PRINTTAB(5,1)"Score"SPC16"Lives"
 1120 VDU19,1,CC;0;19,2,CY;0;
 1130 VDU19,7,3;0;19,0;0;0;
 1140 VDU23,1;0;0;0;0;:ENDPROC
 1150 DEF PROCskulls(T%)
 1160 LOCAL SX%,SY%,C%:C%=C%(T%)
 1170 SX%=SX%(T%):SY%=SY%(T%)
 1180 IF SX%<8 OR SX%>29 OR RND(10)=1:C%
=-C%
 1190 IF FY%=SY% IF SX%+3=FX% C%(T%)=-3:
ENDPROC
 1200 IF FY%=SY% IF SX%-3=FX% C%(T%)=+3:
ENDPROC
 1210 COLOUR 0:PRINTTAB(SX%,SY%)F$;
 1220 SX%=SX%+C%
 1230 IF SY%=DY% IF SX%=DX% dead=TRUE
 1240 COLOUR 2:PRINTTAB(SX%,SY%)F$;
 1250 SX%(T%)=SX%:SY%(T%)=SY%
 1260 C%(T%)=C%:ENDPROC
 1270 DEF PROCplace-fish
 1280 FX%=-1:FY%=-1
 1290 SOUND1,2,160,6:SOUND2,2,120,6
 1300 LOCAL X%,Y%:REPEAT
 1310 Y%=4+RND(7)*3:X%=8+RND(6)*3
 1320 UNTIL FNat(X%,Y%)=0
 1330 COLOUR 7:PRINTTAB(X%,Y%)G$
 1340 fish=fish+1:eat-fish=FALSE
 1350 FX%=X%:FY%=Y%:ENDPROC
 1360 DEF PROCdie:PROCwait(.5)
 1370 COLOUR 1:FOR T%=1 TO skulls
 1380 PRINTTAB(SX%(T%),SY%(T%))F$:NEXT
 1390 FOR Y%=100 TO 0 STEP-4
 1400 SOUND&11,2,Y%,1
 1410 SOUND&12,3,Y%,1:NEXT:PROCwait(1)
 1420 FOR D=.01 TO .095 STEP .005
 1430 SOUND&11,2,150,5:COLOUR7
 1440 PRINTTAB(DX%,DY%)A$:PROCwait(.1-D)
 1450 PRINTTAB(DX%,DY%)C$:PROCwait(.1-D)
 1460 PRINTTAB(DX%,DY%)B$:PROCwait(.1-D)
 1470 PRINTTAB(DX%,DY%)E$:PROCwait(.1-D)
 1480 NEXT:PROCwait(.4)
 1490 PRINTTAB(DX%,DY%)D$
 1500 SOUND1,4,4,2:PROCwait(.2)
 1510 FOR D%=1 TO 5
 1520 PRINTTAB(DX%,DY%)H$:PROCwait(.15)
 1530 SOUND0,4,1,1:SOUND1,4,4,1
 1540 PRINTTAB(DX%,DY%)D$:PROCwait(.13)
 1550 NEXT:PROCwait(3):COLOUR 0
 1560 PRINTTAB(DX%,DY%)A$TAB(FX%,FY%)A$
 1570 FOR S%=1 TO skulls
```

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```
 1580 PRINTTAB(SX%(S%),SY%(S%))A$
 1590 NEXT:lives=lives-1:ENDPROC
 1600 DEF PROCwait(t)
 1610 LOCAL T%:T%=TIME+t*100
 1620 REPEAT UNTIL TIME>T%:ENDPROC
 1630 DEF PROCupdate:GCOL0,1
 1640 MOVE 150+time,20:DRAW 150+time,14
 1650 time=time-1:VDU4:IF time=0 dead=-1
 1660 COLOUR7:PRINTTAB(11,1);score;
 1670 PRINTTAB(32,1);lives;
 1680 COLOUR1:PRINTTAB(19,1);fish;
 1690 ENDPROC
 1700 DEF PROCbonus
 1710 FOR S%=4 TO 100 STEP 4
 1720 SOUND&11,3,S%,2:SOUND&12,2,S%,2:NE
XT
 1730 PROCbox(16,7,13,7,0,"")
 1740 VDU5:GCOL0,1:MOVE480,590
 1750 PRINT"B O N U S"
 1760 score=score+target*10
 1770 GCOL0,2:MOVE540,440:PRINT;target*1
0;
 1780 GCOL0,1:MOVE524,390:PRINT"POINTS"
 1790 FOR H%=365 TO 850 STEP 75
 1800 GCOL0,0:MOVE H%,520
 1810 VDU249,250,8,8,10,251,252:NEXT
 1820 CC=CC+1:IFCC=3CC=4 ELSEIFCC=7CC=1
 1830 CY=CY+1:IFCY=3CY=4 ELSEIFCY=7CY=1
 1840 VDU19,1,CC;0;19,2,CY;0;
 1850 VDU19,7,3;0;19,0;0;0;
 1860 PROCwait(5):PROCgrid:ENDPROC
 1870 DEF PROCendgame
 1880 PROCbox(11,2,13,3,0,""):VDU26,5
 1890 GCOL0,0:MOVE480,590:PRINT"GAME OVE
R"
 1900 GCOL0,3:MOVE485,585:PRINT"GAME OVE
R"
 1910 VDU4:PROCany:ENDPROC
 1920 DEF PROCtitle
 1930 VDU5:GCOL0,1:MOVE550,900:PRINT"DUC
K!"
 1940 GCOL0,2:MOVE552,898:PRINT"DUCK!":V
DU4
 1950 PROCbox(38,5,7,2,1,"")
 1960 PRINT'"You must move the duck trap
ped inside"
 1970 PRINT"a grid around the screen col
lecting"
 1980 PRINT"fishes whilst avoiding the s
kulls."
 1990 PROCbox(38,5,13,1,2,"")
 2000 PRINT'"At the  bottom of the scree
n there is"
 2010 PRINT"a time bar. You must complet
e the"
 2020 PRINT"screen before it reaches the
 end or"
 2030 PRINT"you will lose one of your 3
lives."
 2040 PROCbox(14,6,20,2,0,"")
 2050 PRINT'" Control Keys"'"  Z....LEFT
"
 2060 PRINT"  X....RIGHT"'"  :....UP"
 2070 PRINT"  /....DOWN"
 2080 PROCany:CLS:ENDPROC
 2090 DEF FNat(X%,Y%):LOCAL F%
 2100 IF Y%=DY% IF X%=DX% =1
 2110 IF Y%=FY% IF X%=FX% =2
 2120 FOR S%=1 TO skulls
 2130 IF Y%=SY%(S%) IF X%=SX%(S%) S%=sku
lls:F%=3
 2140 NEXT:=F%
 2150 DEF PROCbox(x%,y%,Y%,B%,F%,t$)
 2160 LOCAL X%,W%,H%:X%=(39-x%)/2
 2170 VDU28X%Y%+y%X%+x%Y%
 2180 COLOUR 128+B%:CLS:COLOUR F%
 2190 PRINTTAB((x%-LENt$)/2+1,y%/2)t$;
 2200 VDU30:ENDPROC
 2210 DEF PROCany:*FX15
 2220 PROCbox(14,2,28,1,3,"Press any key
")
 2230 IFNOTGET:ENDPROC
 2240 DEF PROCreloc(Q%):*TAPE
 2250 IF PAGE<=Q% ENDPROC
 2260 FOR I%=0 TO TOP-PAGE STEP4
 2270 I%!&E00=I%!PAGE:NEXT
 2280 ?&13=?&13-(PAGE-&E00)DIV256
 2290 PAGE=&E00:RUN
```

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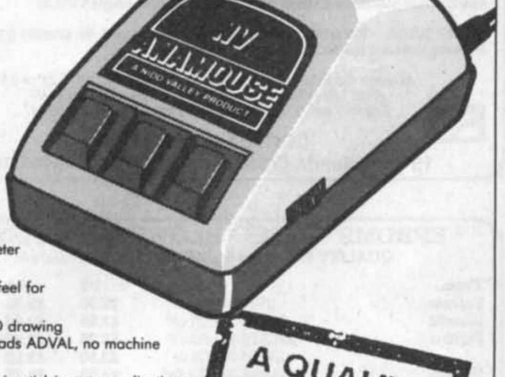

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LETTERS

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Reversing Epson paper feed

THE following gives a more detailed description of how to reverse paper on Epson compatible printers as mentioned in Peter Nobel's letter in the February 1987 issue of The Micro User.

If you use the statements VDU 1,27,1,106,1,n and VDU 1,27,1,74,1,n many Epson compatibles reverse or advance paper by n/216 inches at a time.

For example, choosing n=36 will give a line spacing of 1/6th inch. The maximum value for n is 255, giving about 1.2 inches.

But choosing the largest value less than 255 which is equal to an exact number of lines of the spacing being used will save time and speed. For example, using n=252 will reverse/advance by exactly 7 lines with each spaced 1/6th inch.

To reverse or advance the paper by any sizeable amount, use a simple FOR-NEXT loop around the appropriate VDU statement with n as large as possible to get close to the required position.

For example, FOR R=1 TO 7: VDU1,27,1,106,1,255: NEXT will roll back the paper approximately 8.26 inches. Alternatively, using n=252 will roll back exactly 49 (7x7) lines each spaced 1/6th inch.

To fine-tune and get to the precise position, reverse or advance the number of lines remaining, using another FOR-NEXT loop. The value of n will here depend on the line spacing required.

So for 1/6th inch spacing n=36, and say 3 lines, the statement is FOR A=1 TO 3:VDU1,27,1,74,1,36:NEXT.

A word of caution: You should consult your manual about reversing paper when close to the end of the sheet or the paper roll. There is a danger on some printers that the paper out detector switch may be fouled and damaged. – **John Henson, Dundonald, Kilmarnock.**

Extending Mini Office II

I HAVE had a BBC model B for five years now and I have used many professional programs including several word processors and databases, but I have yet to use one which is as friendly to use as Mini Office II.

I have been using it now for several months and I find it very useful for writing letters, and for producing graphs and diagrams for my reports at university, where I am studying for a BSc in Physics/Computer Science.

I have been using it for labelling folders, textbooks and even discs. The package has a lot to offer and I have here a few tips for certain areas. Some only apply to disc users and people with shadow ram but I hope that the others will be of use to all.

If the first line of your text is VDU19,0,4,0,0,0 surrounded by embedded command codes (f5 and f6) then the background will appear blue. When you preview it you can get a better idea of how it will appear on paper.

Another useful idea is to put word processor file in the W directory and spreadsheets in the S directory. This makes it easy to see what is on a disc simply by looking at the different directories.

Function keys can be programmed and used in edit mode by pressing Control+Shift+fkey. If you are fortunate enough to have shadow ram then even with the disc-based program you have a word processor to rival many of the rom-based ones.

*Some options are not set up in the menus and at first I wasted a few pages by forgetting to type *FX6,1. To set up your commands use the word processor – type in a command and take a new line for each one.*

*Here are a few simple ones: *FX5,1 to turn on the printer; *DIR W for the word processor directory; *TV255,1 to move the display down one line; and *SHADOW to enable 80 columns on a Model B+.*

Having typed in your commands you should press Escape, then go to the Save Text option and press Return. Save as an Ascii file called !SETUP, then go back to the Main menu.

*When you want to set up your computer with printer, screen position and so on type *EXEC !SETUP and the computer will be set up as selected. This saves a lot of time each session and is easily done.*

The database is another powerful option and my main use for it is storing addresses which I then transport to the label printing option.

Before printing the labels you might want to print them in emphasised or bold text, which you can do with by the Send Printer Codes option. The manual is not specific as how to send these but they are in effect the same as the word processor option – if you wanted emphasised text you should key 27 Return, 69 Return followed by another Return.

These commands are for Epson compatibles but your manual should give you the similar codes. – **S. Lamont, Belfast, N.I.**

Date stamping

TO LOAD the Date Stamper to a VIEW family disc or any other disc which is for use with the Turbo panel installed in the Master, proceed as follows.

It is assumed that the program is keyed from the listing in the February 1987 issue of The Micro User *on to a utility disc with the filename DATER.*

DATER must have line 590 changed to read:

```
590 *SA.DATE FFFF0C00+9E
```

*Configure NOTUBE and insert the disc which is to have the Date Stamp facility, key *DIR $ and SAVE"DATER" to directory $, and RUN it. This will load DATE into the disc.*

*Now configure TUBE, and key *DATE to activate the Date Stamper. If the disc is normally !booted, add *DATE into the !BOOT commands.*

*From now on all files SAVEd will be date stamped. You can check this by keying *INFO*.* – **N.B. Brecknell, Cheam, Surrey**

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● **Want to write to Micromail? The address is: Letters The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.**

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Accessing database files

DOES anyone make a database which can be accessed from within Basic programs, so that we can both save or recall customer addresses into our accounting programs, and also use the database to, for example, list customers

Turn to Page 162 ▶

LETTERS

◄ **From Page 161**

which use a particular product? The database needs to hold large quantities of data (preferably ADFS-based) and have fast access. – **Dr. Robert Kenward, Wareham, Dorset**.

● If you know its structure, any database file can be accessed from Basic. But specifically the Delta System by Minerva Systems provides a very flexible database handling system accessible from Basic.

Interactive teletext

I AM pleased to see that you have recently featured articles on the teletext system. Please continue to do this, and publish more interactive teletext software.

I have modified the carousel program published in the March edition of The Micro User *to work on my Acorn adapter with the excellent ATS rom (that must be the bargain of the year even without your special price for the adapter), and I was interested to read Jeremy Brayshaw's article in the April edition. I have now taken out a subscription to* The Micro User *on the strength of these two features, and look forward to the Ceefax news in the next issue.*

I can honestly say that my teletext adapter has radically changed my computing habits and greatly increased the enjoyment and usefulness of this hobby.

I realise that you are the only magazine to provide programs for downloading off-air, and congratulate you for this, but why are they so old and so few?

You proudly proclaim to provide the current magazine programs for free downloading on MicroLink, so why not on Ceefax? – **John Woodthorpe, Rochdale, Lancs.**

● We are looking at the possibility of putting some current programs on Ceefax. The problem is ensuring that the BBC know about our plans far enough in advance to include them in their schedule.

Hunkie Egg problems

I AM having trouble with the listing of Hunkie Egg in the April issue of The Micro User. *I can't type in line 2830 because it's too long, and even if I use D. for DATA. And the last line ends in a comma. Is this right?* – **B. James, Didsbury.**

● As with all our programs, Hunkie egg was listed directly from the working copy. Unfortunately nine characters were lost by the typesetting machine, the last line should be:

```
 2980 DATA1,1,1,1,1,1,1,1,4
,1,1,1,1,1,1,1,1,1,1,4,1,3,
1,3,1,3,5,1,3,1,3,1,3,1,4,1
,1,5,1,3,1,4,1,3,1,1,3,1,4,
1,3,1,5,1,1,3,1,3,1,7,1,1,1
,4,1,1,7,1,3,1,3,1,1,1,1,1,
1,5,1,1,1,7,1,1,5,1,1,1,1,1
,2,2,2,2,2,2,2,2,2,6,2,2,2,
2,2,2,2,2,255
```

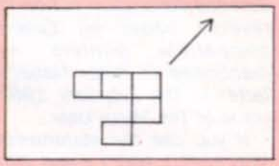
Line 2830 was created using a data creation program rather than being typed in by the author.

You can just split it and create a new line 2835:

```
 2830 DATAA05050,A000FC54,A
0,15540000,A8547E,F000,DA50
0000,7E88CCCC,A8540050,CFCF
8A00,45EECCCC,5454CF,DBCF45
00,8888E6E6,54DECFCD
 2835 DATAE7CF8A00,4444D9D9
,A0E5CFCE,CFCF4500,8ADDCCCC
,A0A0CF,EDA80000,B544CCCC,5
0A000A8,2AA00000,50A0B5,FC0
0,54A8A8,5400F0A0,54
```

In touch with Life

YOUR description of the Game of Life in the November 1986 issue of The Micro User *doesn't mention that patterns which grow off the edge of the screen are intended to reappear on the opposite side.*



When I fire a glider like the one shown at the right hand edge, sure enough it reappeared on the left. But it will only do this at the top and bottom edges if you make a small change in the machine code section of the program. Line 1430 needs to be moved to a line between 1460 and 1470. – **M.J. Paterson, Putney, London.**

Interword limitation

I AM the owner of a BBC Master 128 with 65C102 Turbo and I'm writing to warn people about a slight problem I encountered with Interword.

A couple of days ago I decided that I would reconfigure the language from Basic to Interword. All went well until I switched on the coprocessor, and when I had finished I turned off the machine.

When I turned it back on later I found that it had developed a case of nothingness. Because the tube was active, the Master had tried to copy Interword across and of course failed. It seems that the message "Turn second processor off" didn't have a chance.

In the end I had to resort to the gentle (if in doubt take it out) extraction of the Interword with the machine turned off, then reconfigure the language back to Basic (rom position 12).

Apart from this I have found Interword to be an excellent, easy-to-use wordprocessor. – **Martin Brown, Amersham, Bucks.**

£10 Prize letter

Toolkit conflict

WITH regard to your review of the Knitting Software package in the March edition of The Micro User *I feel I must write and not only echo your reviewer's comments on the package but add more.*

If the package is used with Beebug's Toolkit, when you try and save one of your own designs all you get is the following error message:

```
No such variable at L.80
OSCLI("*REN."+":2.T.DESIGN"
+" "+"2.D."+F$)
```

This message appears even if Toolkit is in a lower priority than the rom supplied with the Knitting Software. If Tookit is above the Knitting rom then I suspect the disc gets corrupted – mine was but I cannot prove that this was the cause.

I do not usually rush out and buy packages like this, I wait for the reviews before making a decision. But as the package was intended as a Christmas present for my disabled wife I did so.

I must say though that the experience has given me a NEW(in)SIGHT into the folly of just reading the advertising hype and believing what you are told on the telephone.

I would also be interested to know if any of your other readers have had success or failure with this package. – **Pete Smith, Melton Mowbray, Leicestershire.**

● You are correct in assuming that there is a conflict with Toolkit. The *REN. is being grabbed as Toolkit's *RENUMBER instead of the DFS's *RENAME.

Although it is not the problem in your case, this line would also prevent the Knitting Software working on BBC Micros fitted with Basic I.

LETTERS

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

Character references

AFTER reading Nigel Reed's letter in the December issue of The Micro User *on printing a pound sign, I thought he would be interested in how the characters are formed inside the computer.*

The following program prints on the screen individually each character in the memory and its binary form:

```
  100 REM * Char Display *
  110 CLS:X%=&70:Y%=0:A%=1
0
  120 FOR C%=32 TO 126
  130 PRINT';C%":"CHR$C%
  140 ?X%=C%:CALL &FFF1
  150 FOR L%=1 TO 8
  160 PRINT FNbin(X%?L%)
  170 NEXT:NEXT:END
  180 DEF PROCbin(B%)
  190 LOCAL Z%,b$,c$
  200 FOR Z%=0 TO 7:c$="0"
  210 IF (2↑Z%)ANDB% c$="1
"
  220 b$=c$+b$:NEXT:=b$
```

— **Stewart Adamson, Sheet, Petersfield, Hamps.**

Modifying View Ruler

I WAS very interested to see your View Ruler utility in the November issue of The Micro User *and found that it worked well with View 2.1.*

Is it possible to modify the program so that it will work with Hi-View? — **Dr.E.Latusek, Padfield, Hadfield, Hyde.**

● *Chris Nixon replies:* I am afraid that this routine cannot run in the Input/Output processor of a BBC Micro while a second processor is connected.

As I have no access to a second processor to test this, I can only suggest relocating the code to a high location within the second processor (say about &7000) by changing lines 120 and 660 accordingly.

However, as I am unfamiliar with the memory map, are there any readers out there who can help?

Jenny Greenteeth

I MUST admit that I have not tried the Dino game in the March issue of The Micro User *– to be honest, I never bother with games.*

One of the best things about the magazine is that it provides enough for almost any reader, whether or not they are interested in games, business or any other aspect of BBC Micro use.

In any case, I was a bit surprised by Gordon Key's game and don't entirely approve. It sounds silly I suppose, but let me explain.

Not many people, especially outside the North, know about Jenny Greenteeth, and those that do tend to have a very strange view of her. In fact, she was my umpty-great grandmother and not half as bad as she is painted.

Her real name was Jenet Preston and, while I admit that she was hung for committing murder by witchcraft, she was not some kind of undead cannibal – much less a dinosaur eater.

Now, I think that 300 years is a long time to hold a grudge against someone, whatever she may have done. So next time you need a monster how about an imaginary one, please? – **M.A. Preston, Whitworth, Lancashire.**

● *Gordon Key replies:* I have done a little research on the point to confirm my own memories on the matter and it seems that the name predates Jenet Preston by a considerable time.

Jenny Greenteeth was originally the name for a form of water sprite or siren who sprang from the Cumbrian lakes to entice children into the water where she consumed them.

The Greenteeth portion of the name doesn't refer to a dental problem but to the leaves of plants that grow at the water's edge. In later times the fable spread south to Lancashire as it probably proved to be an effective way of keeping children away from dangerous stretches of water.

Testing joysticks

£10 Prize letter

THE March issue of The Micro User *included a reader's problem which required a program to test the working of joysticks.*

Some time ago I wrote a short program to do this, after discovering that my new joysticks failed to work. I was using them with a game listed in a magazine (not The Micro User*) and was not sure which to blame.*

After using the program I discovered that the joysticks were reverse-wired, so that the "left hand" stick was actually the right hand stick, and the listing contained an error which swapped the east-west and north-south movements on one stick but not the other.

In both cases the remedies were simple, once the problem was clear.

The raw ADVAL numbers fluctuate wildly from moment to moment, presumably because of random voltage fluctuations. The effect of the DIV statement in lines 210-240 is to steady this, but it can be altered by changing the value of N% in line 30. – **Bob Forde, RAF Gatow, Berlin, BFPO 45.**

```
   10 REM ** Joytest **
   20 CLS:VDU23;8202;0;0;0;
   30 DIM f$(3):N%=256
   40 FOR L%=0 TO 3
   50 READ f$(L%):NEXT
   60 PRINTTAB(0,6)"JOYSTIC
K TESTER"
   70 PRINT'"Channel"
   80 PRINT'TAB(3)"0:"
   90 PRINT'TAB(3)"1:"TAB(2
1)"Left: east-west"
  100 PRINT'TAB(3)"2:"TAB(2
1)"Left: north-south"
  110 PRINT'TAB(3)"3:"TAB(2
1)"Right: east-west"
  120 PRINT'TAB(3)"4:"TAB(2
1)"Right: north-south"
  130 REPEAT
  140 X%=ADVAL(0)AND3
  150 PRINTTAB(7,10)X%TAB(2
1,10)f$(X%)
  160 PRINTTAB(7,12)ADVAL(1
)DIVN%
  170 PRINTTAB(7,14)ADVAL(2
)DIVN%
  180 PRINTTAB(7,16)ADVAL(3
)DIVN%
  190 PRINTTAB(7,18)ADVAL(4
)DIVN%
  200 UNTIL FALSE
  210 DATA "Neither firing"
  220 DATA "Left firing    "
  230 DATA "Right firing   "
  240 DATA "Both firing    "
```

Yet more about Life

THANK you for the program Life in the November 1986 issue of The Micro User. *I've wanted a version for many years.*

I've now written a freeze and modify option – you hit the spacebar during the display and go into the design routine. The modifications are:

```
175 IF INKEY-99 PROCplot
611 PROCplot:ENDPROC
612 DEF PROCplot
```

Resume operation with Return as usual. This facility gets you more in touch with what is going on. – **John Morton, London.**

Turn to Page 164 ▶

LETTERS

Working with View Ruler

I HAVE just typed in the listing for the View Ruler from the November 1986 issue of The Micro User, *and am very pleased with the results. I will probably use it most of the time but there are, however, two little problems.*

*Firstly my Master 128 would not give me the shadow cursor without my typing in the *GO C00 command and secondly, I lost the ability to change screen colour with the Control+S command. As soon as I type Control+S the characters appear in red. It seems OK if I change the colour before I type *GO C00 command.*

I not only use View on a regular basis but I also teach others to use it: Any utilities of this type are of interest to me and my students.

One addition I would like to have is a display telling me how many spaces from the left of the screen my cursor is positioned, with position 1 being the first typing position on the screen, not the spaces where the stored commands appear.

This would be very useful because the tabs have been preset every eight spaces and not every five or ten which is more usual for word processors.

At present the only guide to character position is the tabs if you want to set the right margin in a particular place. Alternatively a utility shifting the tabs to every five or ten spaces would be of some help.

Can one of your keen readers/programmers be tempted by my challenge? – **Dee Vincent-Day. Perivale, Middx.**

● *Chris Nixon replies:* I cannot understand why you have to type *GO C00 to get Ruler working. I have fully tested it on my Master 128, and the following sequence of instructions should work: type *RULER Return, then *WORD Return and finally press Escape.

The first two steps may be in any order. It occurs to me, however, that you may start-up View in mode 7 or 135, in which case Ruler will not function until a lower mode has been selected.

As I said in the article, once Ruler has been *RUN, you can switch from View to Basic and vice-versa quite happily without having to rerun Rule, but you may have to if you run any machine-code games or utilities in the interim.

The reason you cannot force a colour change with Control+S is that I trap all such key presses, and there is not enough memory for me to process this (or similar direct control codes) in the correct way. The solution is as you say, to do the colour change before *RUNning Ruler.

Other utilities will not clash with Ruler so long as they steer clear of zero page &90–&92 and the whole of page 12 (&C00–&CFF) and are careful when diverting the osrdch vector further.

Going beyond the User Guide

HERE are some memory-saving tips which go beyond the recommendations given in the User Guide. Readers plagued by No Room messages might like to try the following.

The User Guide suggests taking blank spaces out of programs, but does not mention that many brackets can be dispensed with. You do not need them in expressions such as LENA$, CHR$A% VALA$, ASCA$, DIME%20, although they must be retained if you use more complicated expressions such as CHR$(A+B).

Keep names of variables and procedures as short as possible and use multiple statements per line.

Avoid verbose text in the program, and substitute strings for repeated long words and phrases. For example, if you keep giving instructions involving the phrase "Now please type in", then set T$="Now please type in" and use T$ in your print statements.

Substitute subroutines for procedures. This heretical advice arises from my experience of running a complex program which would run cheerfully for a long time, but then crash unpredictably with a No Room message. Since all my variables were declared at the start of the program, I could not understand why this happened.

After being plagued by this problem for a year, I realised the cause. Once a procedure is called, but not until then, its name is stored just like a variable name, taking up memory. Calling it again does not affect memory.

If your program includes many procedures which are only rarely called, memory will progressively decline until all procedures have been called.

If you are reluctant to use subroutines, and if your program structure permits it, you can avoid this sort of problem by periodically using CLEAR, which clears procedure names as well as variable names.

Finally you can monitor the amount of remaining memory after your program is loaded with PRINT HIMEM-TOP, and you can watch memory decline during program execution with PRINT HIMEM–(!2 AND &FFFF), which gives the memory between HIMEM and top of variable storage space.
– **Dorothy Bishop, Manchester.**

● The main reason for slowly running out of space is the way BBC Basic allocates string space. If you have a statement A$="1234", eight bytes of space are allocated to the string A$, allowing its length to increase up to that size without problem.

If you now set the string A$="123456789" then the string space is insufficient and a new block of 16 bytes is allocated and the initial block is now discarded and wasted. This process can continue as you allocate and reallocate string variables.

Try this short program to see how space diminishes:

```
10 MODE7
20 A$="":B$=""
30 FOR A%=1 TO 255
40 A$=A$+" "
50 B$=B$+" "
60 PRINT HIMEM-(!2 AND&FFFF)
70 NEXT
```

Now add line 15:

```
    15 A$=STRING$(255," "):B
$=A$
```

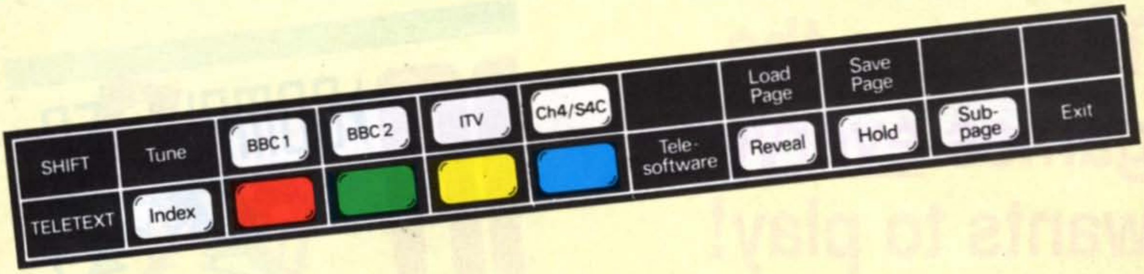
And rerun the program. Now compare the amount of space left at the end of the program, and you will find that the first version uses over 7k more variable space.

The moral of this story is that you should initialise string variables to the longest length they are likely to achieve in the program.

ADFS disc formatting

PLEASE will you tell me how to format the ADFS disc? – **Desmond Masterson, London.**

● The ADFS disc formatter is on the Welcome disc in the Library directory, and is called AFORM. To format an ADFS disc, insert your Welcome disc, and type *AFORM. When the program has loaded remove the Welcome disc, insert the disc to be formatted and proceed from there.



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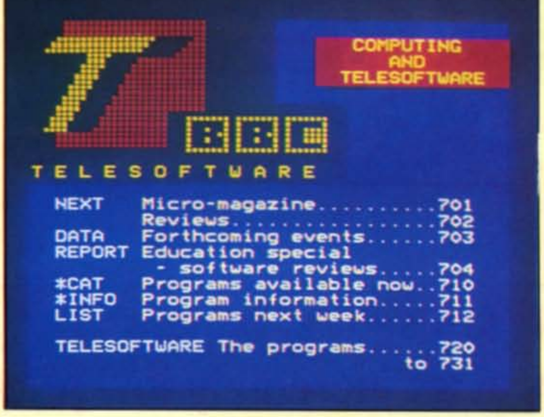

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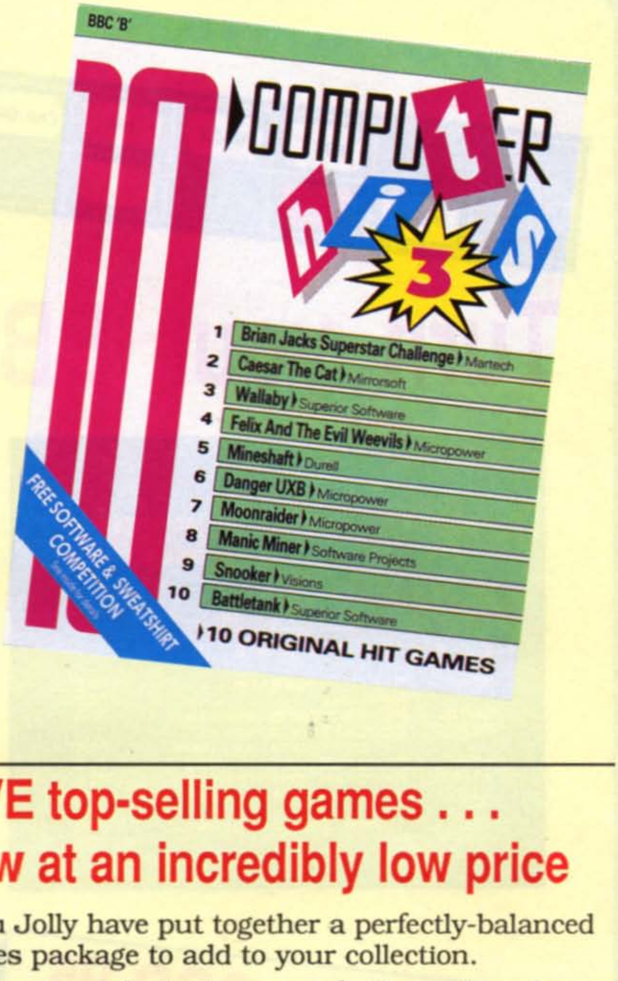
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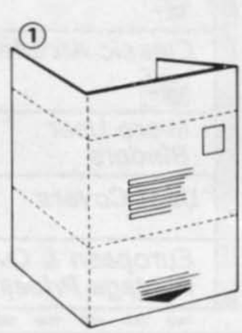

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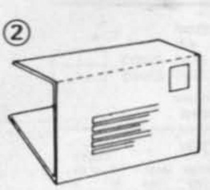

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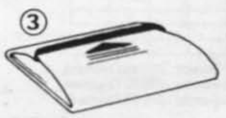

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AMS ... 61
ARK ... 170
ATPL ... 148
Acme Computer Co. ... 82
Amig Systems ... 96
Argus Specialist Press ... 52
B&S Computing ... 36
Beaumont Computers ... 160
Beebug ... 62 & 75
C&F Associates ... 122
CJE Micros ... 11
CMS ... 66
CP Microsystems ... 56
Capital City Electric ... 160
Care Electronics ... 58
Centec ... 122
Chiltern Communications ... 160
Clares Micro Supplies ... 8
Communitel ... 142
Compumart ... 155
Computer Concepts ... 49 & 157
Computeck ... 160
Contex ... 160
Mr Craddock ... 169
Datastore ... 142
Design Dynamics ... 58
Design People Software ... 114
Direct Disc Supplies ... 149
Disking ... 44 & 45
Dram Electronics ... 126
ECL ... 14
Firebird ... 69
Flora Electronics ... 138 & 170
Paul Fray ... 170
GPD Systems ... 100
IDS ... 114
Incentive Software ... 127
Kosmos Software ... 96
LAN Computer Systems ... 134
Logotron ... 3
Mailtech ... 169
Mancomp ... 122
Metro Heath ... 121
Microdis ... 38
Micro Help ... 126
Micro Media ... 25
Micropower ... 147
Midcomm Int. ... 96
Minerva Systems ... 138
Mini Business Systems ... 169
Morley Electronics ... 12
Nebulae ... 96
Nidd Valley Micro ... 159
Opus Supplies ... 83, 101 & 123
Oriole ... 82
P&H Electronics ... 46
Pace Micro Technology ... 76 & 118
Pavilion Software ... 160
Peartree Computers ... 15-21
Permanent Memory Systems ... 121
Pineapple Software ... 54
RD Speech Technology ... 48
Rockfort Products ... 131
SA Software ... 170
SJ Research ... 22
SP Electronics ... 170
Selec Software ... 56
Serious Statistical Software ... 169
Software Bargains ... 41
Silicon City ... 160
Solidisk ... 26-29
Squirrel Software ... 126
Superior Software ... 2, 171 & 172
System ... 148
Technomatic ... 34-93
Those Engineers ... 126
Twillstar Computers ... 150 & 151
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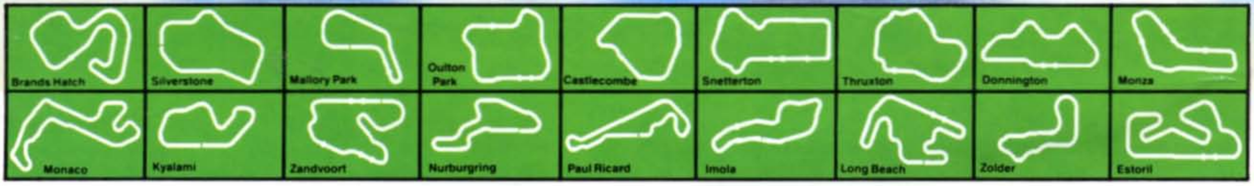
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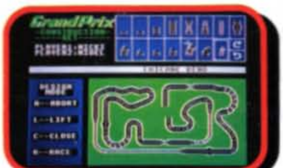

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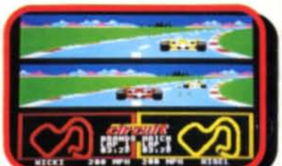

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